Coal Age

ANTHRACITE MID-CENTURY

Modernizing Haulage for Efficiency • New "Continuous" Conveyor
Cutting Strip-Haulage Costs • Mountaintop Coal Cleaning
Plastic Sealing • Mine Power Centers • Coal-Cleaning Trends

ONE THIRD FEWER MINE CARS

"Why pay for running 100 mine cars when 64 will do the job?" That is the question a Southern coal operator asked himself recently. And he answered it by replacing 100 old mine cars with just 64 A.C.F. Drop Bottom Cars!

Certainly, it *sounds* wonderful to be able to get out the same coal tonnage with only ⅔ as many mine cars...and often with fewer men! Think of the savings on labor, maintenance, replacement parts—to say nothing of the lower initial cost!

Haulage system modernization has often proved that A.C.F. Drop Bottom Mine Cars can make such savings!

It's all done with minutes. Every time a trip of A.C.F. Drop Bottom Mine Cars dumps, that trip gains minutes of extra *hauling* time.

Where it might take fifteen minutes to dump a trip of other types of cars, a 20-car trip of A.C.F. Drop Bottoms will seldom take more than 100 *seconds* to dump! Over the course of a shift, you often gain enough time for *an extra load of coal for every trip of cars!*

A.C.F. MINE CARS

for Constant Haulage

Take a look at the facts and figures on how much you can save at your mine with A.C.F. Drop Bottom Mine Cars. Your nearby A.C.F. Representative will be glad to give them to you. American Car and Foundry Company, New York · Chicago · St. Louis · Cleveland · Philadelphia · Washington · Pittsburgh · San Francisco · Huntington, W. Va. · Berwick, Pa.

RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER

Photo courtesy Millinocket Paper Co

Where B. F. Goodrich grommet belts lasted 8½ years

B. F. Goodrich grommet V belts cut costs 20 to 50%

GROMMET V belts (made only by B. F. Goodrich) handled a transmission job on this drive 24 hours a day for 8½ years. The service is rough—starting causes shock loads, pulsations. The drive is fully equipped with B. F. Goodrich grommet V belts—here's where that extra strength and longer life come from:

No cord ends—A grommet is endless, made by winding heavy cord on itself to form an endless loop. It has no overlapping ends. Because most of the failures in ordinary V belts occur in the region where cords overlap, the endless cord section in a grommet V belt eliminates such failures.

Concentrated cord strength—All of the cord material in a B. F. Goodrich grommet multiple-V belt is *concentrated* in twin grommets, positioned close to the driving faces of the pulley. No layers of cords to rub against one another and generate heat; cord and adhesion failures are reduced.

Better grip, less slip—Because a grommet is endless, a grommet V belt is more flexible, grips the pulleys better. Size for size, grommet multiple-V belts will give ⅓ more gripping power, pull heavier loads with a higher safety factor.

Only B. F. Goodrich has the grommet!—No other multiple-V belt is a grommet V belt (U. S. Patent No. 2,233,294).

Now available in C, D and E sections. See your local B. F. Goodrich distributor. Ask him to show you his "X-ray" belt that illustrates grommet construction clearly. *The B. F. Goodrich Company, Industrial and General Products Division, Akron, Ohio.*

Grommet V Belts BY

B.F.Goodrich

RUBBER FOR INDUSTRY

The Champion

"PREVENTIVE MAINTENANCE"

is the big thing today –

just as it was thousands of years ago!

The Chinese may be mistaken about a lot of things, but they had the right idea in paying the doctor to PREVENT illness, to keep them well, rather than to cure them. Modern management, faced by shortages and rising labor costs, and remembering the difficulties in getting repair parts during the last war, is shifting the emphasis from repairs to preventive maintenance. To PREVENT BREAKDOWNS is far cheaper than to make repairs, especially when replacement parts may be almost unobtainable. In this, the right LUBRICATION plays a major part.

He was the original Champion of **"PREVENTIVE MAINTENANCE"**

HULBURT OIL & GREASE COMPANY, PHILADELPHIA, PA.

Specialists in Coal Mine Lubrication

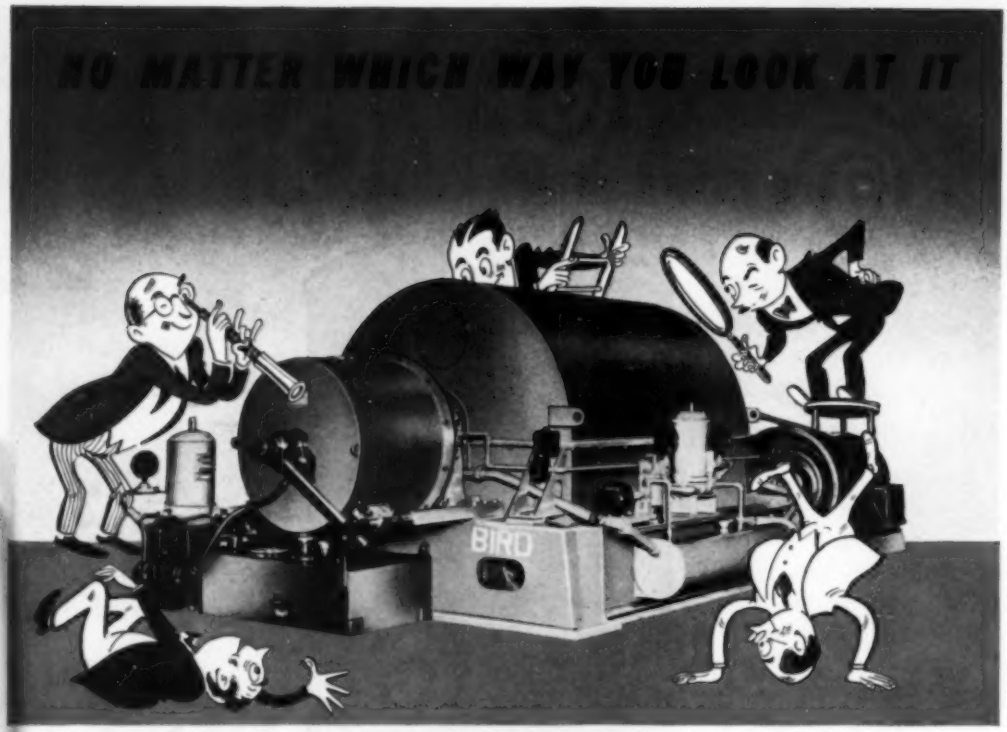
The Champion

...IN COAL MINE LUBRICATION

Hulburt Quality GREASE

"The Champion"

Preventing troubles due to faulty lubrication is nothing new to Hulburt Quality Grease. This Grease stops trouble before it starts — the thing for YOU to do is to start using it for that very purpose NOW. A drum of Hulburt is worth a stack of "rush orders" for repair parts on a cutter or a loader or a locomotive. You WON'T NEED to worry about getting machines back in prduction when you use Hulburt Quality Grease as "the ounce of prevention" to keep them producing by preventing breakdowns. Make Preventive Maintenance the rule in your Coal Mine . . . HULBURT MAINTENANCE.



Here is the *BEST* — The *SIMPLEST* — The *LOWEST COST* way to take the water out of your fine coal after washing...

The BIRD COAL FILTER

The thing to keep in mind is this. The Bird Coal Filter can handle *all* the fine coal, including the *extreme* fines if you wish. When these extreme fines should be excluded from the coal this can be done, and they are readily and inexpensively removed from the cleaning water by the Bird Polisher, putting the water in shape for re-use.

The Bird Coal Filter gets the fine coal as dry as it's possible to obtain by any mechanical means, feed and fines being equal. It does the job at minimum cost of operation and maintenance.

Don't buy *any* kind of fine coal drying equipment until you check performance and over-all cost per ton against the BIRD.

BIRD MACHINE COMPANY
SOUTH WALPOLE • MASSACHUSETTS

Coal Age

THIS MONTH'S COVER

PIT OPERATIONS at the Bolling Construction Co., Pound, Va., stripping coal for the Virginia Coal & Iron Co., Roanoke, Va.

COMING IN MAY

- **The Trend in Mining**—Significant developments indicating the direction of underground mining, preparation and stripping in the future.
- **Coal-Show Preview** — What Cleveland will offer in technical papers, mining equipment and materials.
- **Wet Rotary Drilling for Roof Bolts**—John K. Berry, production engineer, tells how Consol of Ky. solved the problem and what the results were in higher drilling speed and lower bit costs (*New Methods Report*).
- **Eliminating Gob Fires** — Christopher Coal's methods for putting out old fires and preventing ignition of new refuse piles (*New Methods Report*).
- **Efficient Pitch Development** — How the Northwestern Improvement Co. uses a scoop loader and big drill to sink slopes and drive airways and crosscuts in pitching coal (*New Methods Report*).
- **Plus automatic controls** for small centrifugal pumps, strip mining of pilar coal, aluminum pipe for drainage, and the story of how Red Jacket gets high efficiency with trackless mining under adverse conditions at its new Coalburg workings.

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CONTENTS • APRIL • 1951

Editorials: New Angle; The Other Face; Basic Approach 69

Anthracite Mid-Century 70
Progress to date—Prospects for the future.

Modernizing for Efficiency 76
How big cars and better haulage save labor and boost face efficiency.

MDC Evolves New Unit for Continuous Conveying 81
First published report on new extensible conveyor for continuous mining.

Cutting Strip-Haulage Cost 84
New 400-hp diesel engine provides smooth low-cost power at Tiger mine.

Mountaintop Coal Cleaning—W. F. DEADERICK & M. E. HAWORTH .. 86
Lower-cost coal haulage, efficient jigging and dewatering at Wind Rock.

Sealing Roof and Stoppings—F. R. ZACHAR 90
Operating cost and practice in applying plastic at Christopher Coal.

Mine Power Centers—HENRY S. GATES 93
Higher voltages at the face, portability and safety feature modern units.

Trends in Coal Cleaning—JOHN GRIFFEN 96
A detailed summary of the new and modern methods and equipment.

Man-Car Drag Features Positive Action When Needed 106

Stack Erected at Fan Removes Gas Quickly and Safely 106

Shaft Safety Increased by Shop-Made Cage Attachments 108

Drill Motor Powers Mine-Built Moving Truck 109

Conveyor Panels are Simple, Easy to Handle 109

Portable Steel Containers Store Explosives Safely 110

Coupling Guard Fabricated of Expanded Metal 110

Automatic Oilers Lubricate Shaft Guides on Shift 110

Foremen's Forum ..... 110 **News Round-Up** 119

Equipment News and Bulletins 112

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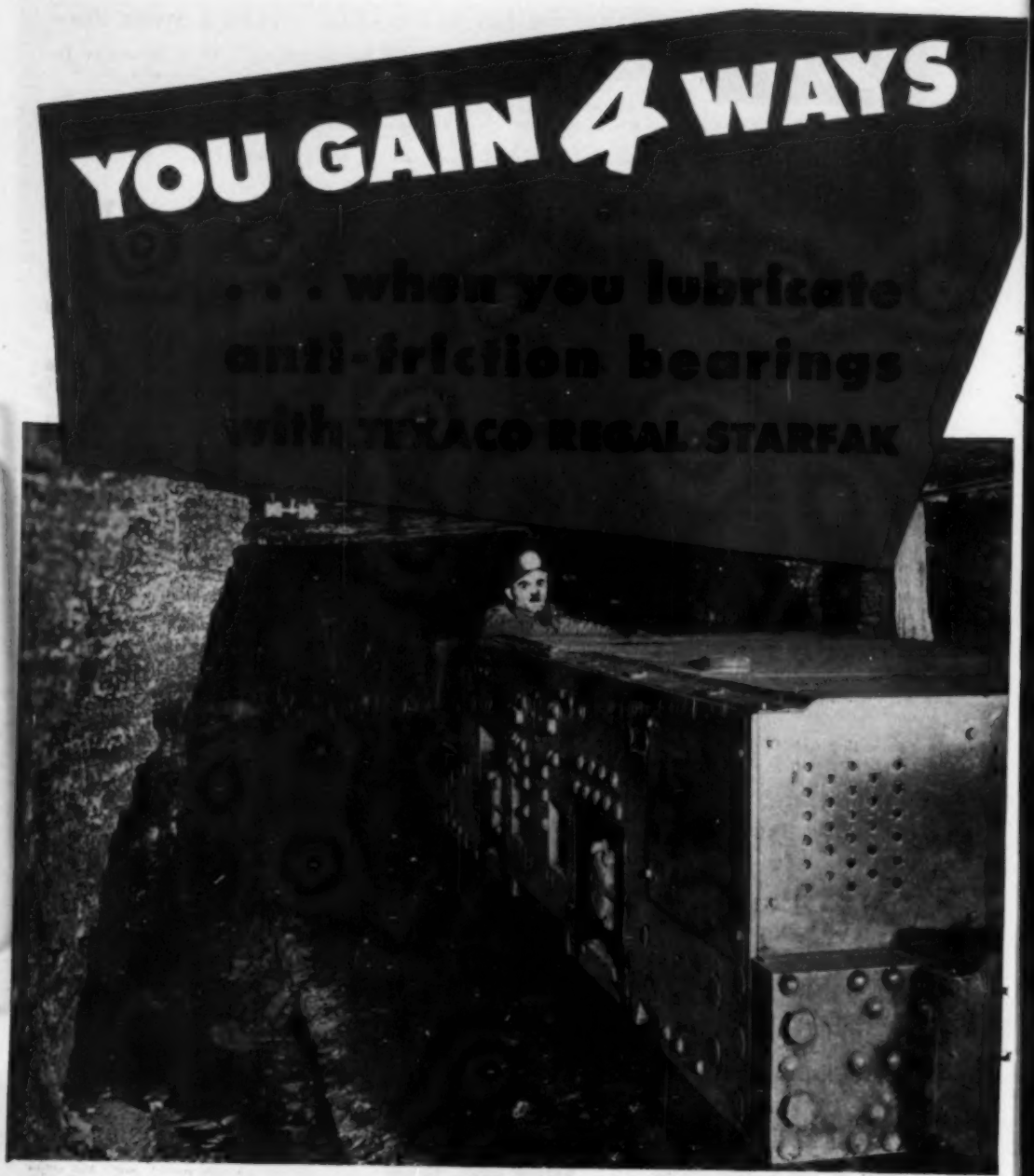


TUNE IN . . .
TEXACO STAR THEATER
starring
MILTON BERLE
on television
every Tuesday night.
See newspaper for
time and station.

TEXACO

TEXACO LUBRICANTS

When you use *Texaco Regal Starfak* in the grease-lubricated ball or roller bearings of your mine locomotives, cutters, loaders and other equipment, you gain these four advantages—

1. LOWER MAINTENANCE COSTS—because *Texaco Regal Starfak* stays *in* the bearings . . . retains its stability under severe operating conditions . . . resists oxidation and gum formation . . . and is far less affected by temperature changes than other greases.

2. LONGER BEARING LIFE – because *Texaco Regal Starfak* gives full, continuous protection . . . stands up where ordinary grease would fail.

3. LOWER LUBRICATION COSTS – because fewer applications are needed. *Texaco Regal Starfak* resists leakage and washout. Each application lasts longer.

4. HIGHER PRODUCTIVITY PER MACHINE – because *Texaco Regal Starfak* assures smoother, more efficient operation . . . keeps machines on the job and out of the repair shop . . . reduces down-time.

In low-speed, heavy-duty bearings, use *Texaco Marfak*. It gives exceptionally long-lasting protection even in the severest service.

Let a Texaco Lubrication Engineer show you how the right use of the right lubricants can improve efficiency and reduce costs for you. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

For the Coal Mining Industry

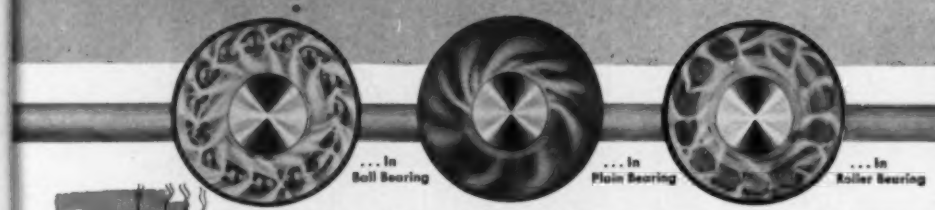
Alemite Announces THE MOST AMAZING

ALEMITE OIL-MIST

AUTOMATIC LUBRICATION SYSTEM

Unbelievably simple system atomizes oil into mist, circulates it through tubing to bearings. Bathes all bearing surfaces with fresh, clean, cool oil film. Uniformly maintains oil film on all sliding, rubbing, rolling parts regardless of variations in load, temperature or speed! No "peaks and valleys" of lubrication.

Fully automatic—eliminates waste and the uncertainties of the "human element." Extends bearing life as much as 17½ times. Seals bearings against dirt and abrasives. Cuts oil consumption as much as 90%. Greatly reduces the number of oils needed.



Here is lubricating progress so major—so far-reaching—as to command the interest of *every* executive concerned with industrial lubrication practices and costs.

You'll marvel that a system so simple—without any moving parts—can bring such a revolutionary change in the lubrication of machinery.

The Alemite Oil-Mist System requires only two simple settings—to control the amount of air pressure, and to regulate the density of the Oil-Mist. Once set, they require no further attention.

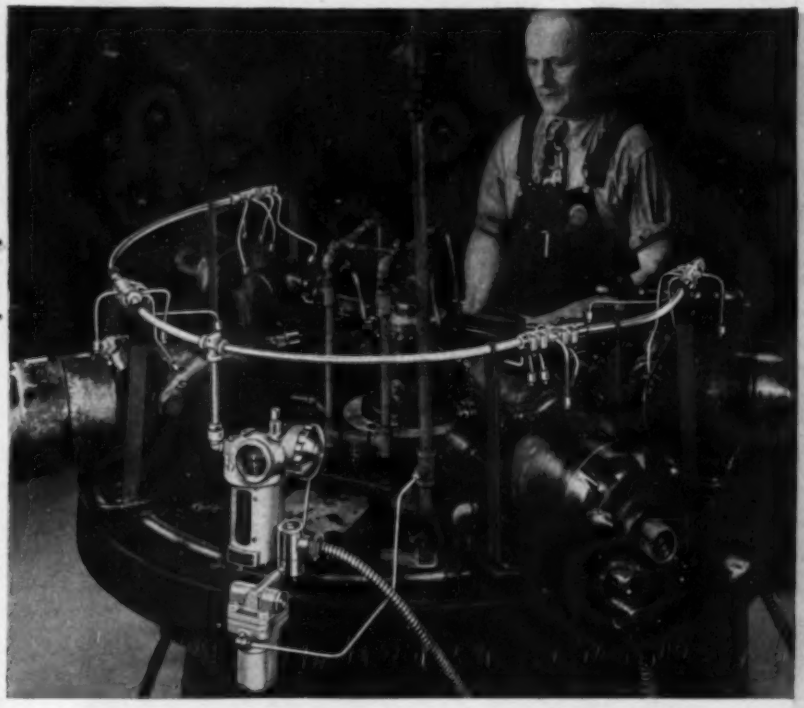
This great new Alemite Oil-Mist System has been proved by plant installations on a wide variety of machines in many industries including steel, coal, food processing, chemicals, metalworking, textiles and woodworking. The results are spectacular—in reduced lubrication costs, reduced maintenance costs, reduced service, reduced "down-time."

Desk-Top Demonstration,

No Obligation—Mail Coupon at Right

The handy coupon attached to your Company letterhead will bring a trained Alemite Lubrication Representative to your office. In a brief yet thorough Desk-Top Demonstration he will answer questions and tell you how Alemite Oil-Mist can provide more efficient lubrication at lower cost than you ever thought possible. Clip and mail the coupon today—to Alemite, Division of Stewart-Warner, 1850 Diversey Parkway, Chicago, Ill.

AUTOMATIC LUBRICATION SYSTEM EVER INVENTED



Here is an example of the many kinds of mechanical motions that can be lubricated by an Alemite Oil-Mist System, using one oil. On this automatic drilling machine Alemite Oil-Mist is lubricating 20 points, including cam, quill, worm and gear, reduction gear, gear and rack, gear train, plain and ball bearings. With Alemite Oil-Mist, this machine consumes only 10 oz. of oil during an 80-hour work week. System draws less than ONE cu. ft. of air per minute at 10 psi.

← OIL MIST ← OIL MIST

8 Advantages of the Alemite Oil-Mist System

1. Continuous Lubrication

Constantly deposits a fresh, clean film of oil on all surfaces of all bearings in the system.

2. Fully Automatic Lubrication

Eliminates the uncertainties of the "human element." (Refilling the reservoir is the only periodic service required.)

3. Elimination of Guesswork

Every bearing picks up only as much Oil-Mist as it needs. No bearing can be overlooked. None gets over-lubricated.

4. Reduction of Bearing Temperatures

Oil-Mist acts as bearing coolant, can lower bearing temperatures as much as 20°F.

5. Reduction of Types of Oil

Oil-Mist greatly reduces the number of oils that must be stocked, handled, and applied.

6. Elimination of "Down-Time"

All bearings in the system are constantly lubricated while the machine continues to produce.

7. Extension of Bearing Life

Oil-Mist multiplies the life of bearings many times. The life of grinding machine bearings has been extended from 400 to 7,000 hours.

8. Consumption of Oil Cut 90%

The Oil-Mist System usually consumes approximately 1/10 the amount consumed by any other oiling method.

Another Product of STEWART WARNER

Alemite OIL-MIST Lubrication

Mail this coupon today!

Alemite, Division of Stewart-Warner, Dept. E-41
1850 Diversey Parkway, Chicago 14, Ill.

☐ Please have your Alemite Lubrication Representative arrange a desk-top demonstration of Oil-Mist. This entails no cost or obligation on my part.

☐ Please send me information about Oil-Mist by mail.

My name .....

Position .....

Company (leave blank if letterhead attached) .....

.....

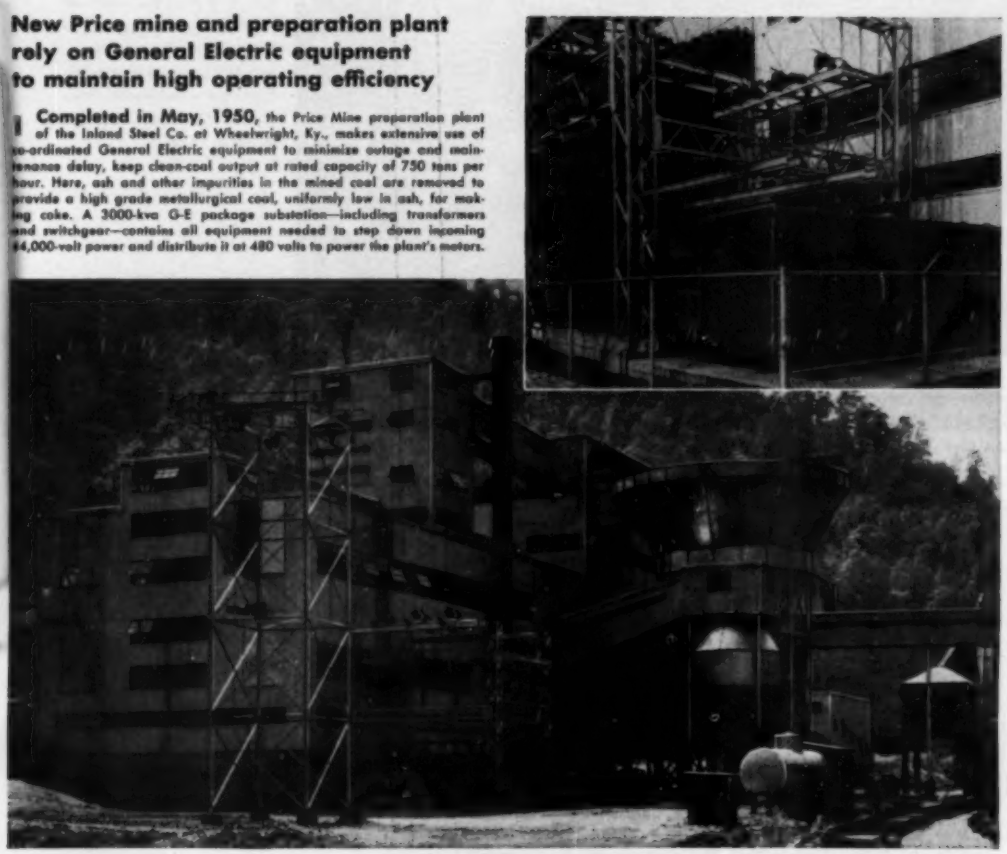
.....

.....

Electrically co-ordinated to keep clean-coal output at 750 tons per hour!

New Price mine and preparation plant rely on General Electric equipment to maintain high operating efficiency

Completed in May, 1950, the Price Mine preparation plant of the Inland Steel Co. at Wheelwright, Ky., makes extensive use of co-ordinated General Electric equipment to minimize outage and maintenance delay, keep clean-coal output at rated capacity of 750 tons per hour. Here, ash and other impurities in the mined coal are removed to provide a high grade metallurgical coal, uniformly low in ash, for making coke. A 3000-kva G-E package substation—including transformers and switchgear—contains all equipment needed to step down incoming 34,000-volt power and distribute it at 480 volts to power the plant's motors.



GENERAL ELECTRIC

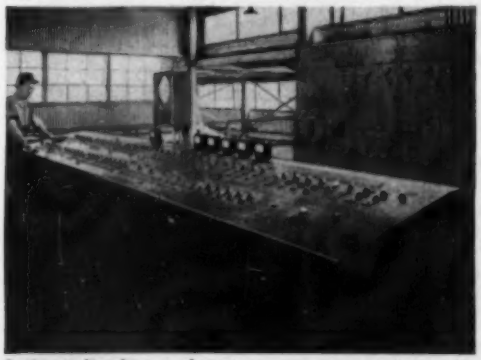
663-14

2 To haul coal from the underground assembly yard to the preparation plant over a 5-mile haulageway, 6 G-E 13-ton high-speed haulage locomotives are used, fully equipped with air brakes and air sanding, and controlled by air-operated contactors. Efficient, powerful, fast and safe, each locomotive makes 5 to 6 round trips per 7½-hour shift, handles 60 cars, each of 4¼ tons total gross weight.

3 To convert a-c to d-c needed for locomotives and other mining machinery, two G-E 300-kw 275-volt d-c rectifiers are used, one stationary and one portable. High in conversion efficiency, these units are easily installed, give high service continuity with minimum maintenance, and are metal-enclosed to protect personnel. Portable type shown is easily relocated to give near-full voltage at the face for more efficient machine operation, and to eliminate long, expensive d-c cable runs.

4 Ventilation for the mine is supplied by a 4-foot high-speed fan driven by this G-E 2-speed Tri-Clad* motor rated 50/12½ hp, 1175/585 rpm, 440 volts. Tri-Clad motors—with 3-way extra protection built in against physical damage, electrical breakdown, and operating wear and tear—are available in enclosures for every mining use. G-E automatic 2-speed control above motor protects fan against single-phase operation, overload, and other possible interruptions to this vital operation.

5 From the washers, after cleaning, ¼" x 0 coal is fed into 6 centrifugal dryers (four shown) driven by G-E wound-rotor motors rated 150 hp, 900 rpm, 440 volts. Plant uses a total of about 3600 horsepower. And with dependable G-E motors and control co-ordinated into a smooth-running, efficient, and low-maintenance operation, each step in the preparation process dovetails with all other steps, minimizing production slowdowns, maintaining high service continuity.



6 Centralized control of plant operations is provided by this G-E main control desk. Push buttons, selector switches and indicating lights are all conveniently combined and centralized at one location, to co-ordinate operations closely, make most efficient use of manpower. G-E Cabinetrol* unit in background, one of several located at control points, contains switch and fuse combination starters, plus interlocks and timers to provide sequence operation.

*Registered trade mark of General Electric Co.

7 All G-E equipment for this mine was supplied on a G-E project co-ordination basis. Find out how this plan can simplify your ordering, save your time, help your consulting engineers and contractors to provide a co-ordinated system to meet your needs. Ask your G-E representative to tell you all about this plan, and send for Bulletin GEA-5308, a 32-page photo report on how G-E is benefiting typical preparation plants. *Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*

How to cut TRACK-LAYING TIME by 2/3

Would you be interested if someone told you that three hours' work could be done in a single hour? That thirty hours of working time could be reduced to ten—with *improved* results?

Many of today's mines are saving in just that ratio when installing Bethlehem prefabricated track. It has been demonstrated over and over that a Bethlehem prefabricated layout can be installed by inexperienced men in *one-third the time* required for cutting and bending rail in the field and then assembling. This is true even when the operations of cutting, bending, and subsequent laying are handled by trained workers.

Skeptical? You needn't be, for actually there's a solid reason behind that figure. The reason: Bethlehem prefabricated track is tailored to the individual mine after a careful study of the workings by Bethlehem track engineers. All rails are precurved to proper radii and cut to proper length before shipment. They are marked with welded bead numbers keyed to corresponding numbers on a blueprint, so that the job of assembly is made even simpler.

And when you finish putting the track together, you have track that is properly aligned right up to the working face—track that will stand up easily under the great loads of modern cutters, loaders, 20- to 35-ton motors, and high-capacity cars.

Bethlehem prefabricated track can be furnished with light or heavy rail, whichever you prefer . . . 20-lb and up. Complete in every detail, it includes not only rails but switches, switch stands, turnouts, braces, guard rails, frogs, steel ties, joint bars, even the bolts and nuts. Ask us for full information.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

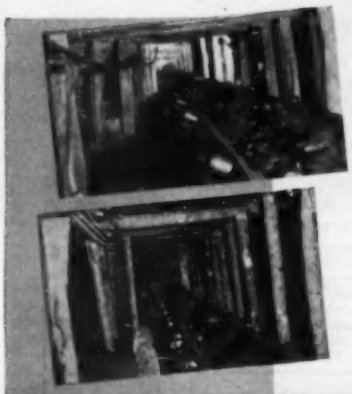
On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

Speed up your gathering and transporting with Goodman TROUGHED BELT CONVEYORS

Quickly installed... extended... relocated

For short runs . . . long hauls . . . for heavy duty service — *wherever a belt conveyor can be used in a coal mine* — there's a Goodman unit exactly right for the job. Every one of them is designed for fast, easy assembly. All of them provide dependable, continuous transportation that means more tonnage at lower cost.



97-C SERIES, TANDEM DRIVE—Suitable for motors up to and including 75 hp. Head and tail ends vary in size to best meet requirements of horsepower, conveyor length and capacity. An important feature is the hook and button style of construction which speeds up assembly, extension or relocation. Intermediate sections, 8 ft. in length, are interchangeable. "Knockdown" design facilitates handling.

97-CS SERIES, SNUB DRIVE—Latest addition to the Goodman line. They are designed for motors up to a maximum of 20 hp. and feature a short, lightweight head section with an over-all height of only 33". Because they are small and utilize the same easy-to-handle, easy-to-assemble intermediate sections as those in the 97-C series, they are especially adaptable to low coal where frequent move-ups are required.

99 SERIES, TANDEM DRIVE—These conveyors feature rugged construction suitable for the faster speeds and higher power required for surge loading or main hauls. Component parts are easily handled, permit quick assembly and compact storage. Intermediate sections are interchangeable, and their method of assembly assures correct alignment. Motors up to 75 hp. can be used.

Your inquiry for details regarding any Goodman belt conveyor is invited. Write today and get the latest on the newest in belts.

Goodman MANUFACTURING COMPANY

HALSTED STREET at 48th • CHICAGO 9, ILLINOIS

Only Carlon ... **THE FIRST REAL PIPE THAT IS PLASTIC**

Absolute resistance to rot, rust, and electrolytic corrosion gives durable, lightweight CARLON PLASTIC PIPE a service life many times longer than that of ordinary mine pipe. CARLON is unaffected by sulphurous waters, alkalies, metallic salts, and other corrosive wastes. In addition, its smooth internal surface will not accumulate scale.

Flexible and rigid types of CARLON are produced in all standard pipe sizes. Flexible pipe is furnished in long lengths which require fewer fittings per installation and will conform to irregular surface contours as well as slope or entry direction. Rigid CARLON is shipped in threaded and coupled random 21-foot lengths that can be joined rapidly by means of threaded plastic fittings. To meet individual job requirements, rigid pipe can be cut to desired length and threaded with standard pipe dies.

A complete line of molded plastic fittings incorporating standard I.P.T. is available for plastic-to-plastic or plastic-to-metal connections.

To eliminate costly maintenance and replacement programs, be sure to specify ONLY CARLON.

At present, raw material shortages are limiting the production of certain types of CARLON pipe. Every effort is being made, however, to overcome this problem and to meet the demand and need for CARLON . . . the first real pipe that is plastic.

CARLON CP 119-CP

CARLON PRODUCTS CORPORATION

IN CANADA: MICRO PLASTICS, LTD., ACTON, ONT.

10462 MEECH AVE. • CLEVELAND 5, OHIO

She's coming down the mountain

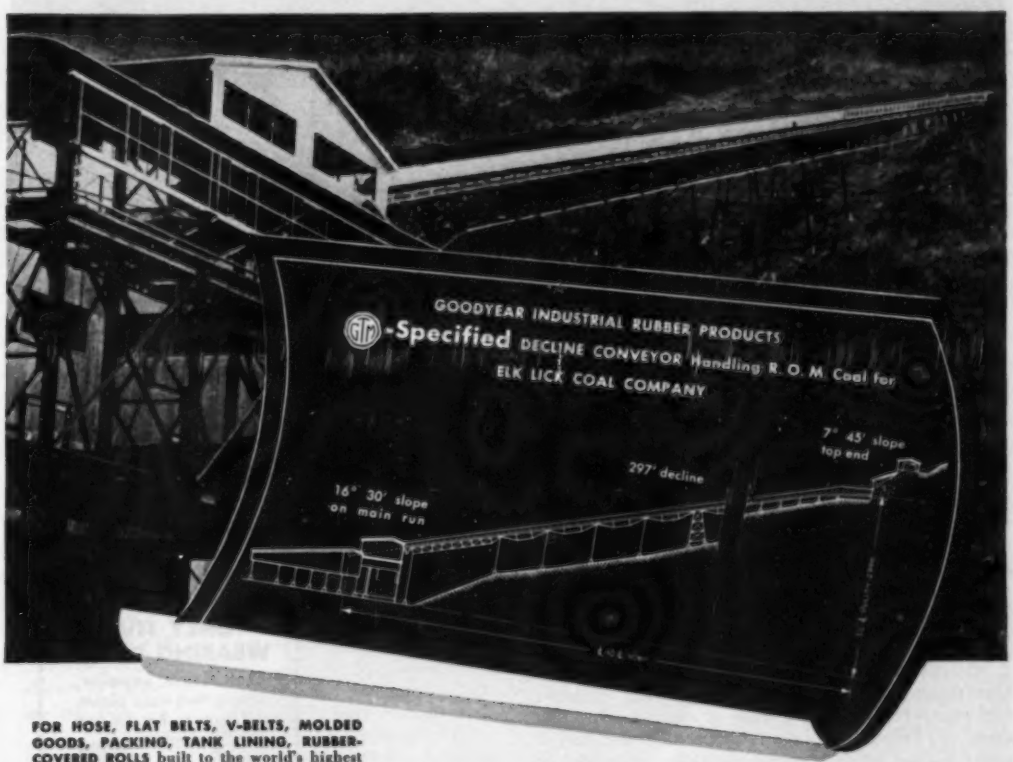
Faster – Safer – at Lower Cost Per Ton

IN the Jerryville, West Virginia operation of The Elk Lick Coal Company, the mine entry is on a hillside 297 feet above the tipple. Coal was brought down by a slow, inefficient, dangerous rail system running on an 8% grade—a carrier that fell far short of handling the mine's production.

Seeking to speed up deliveries, the mine considered every form of transport, including aerial trams, and finally called in the G.T.M.—Goodyear Technical Man—to design a decline conveyor.

Installed six years ago, this conveyor operates on a 16° 30′ slope, in a direct line between entry and tipple—cutting haulage distance to a minimum, handling the entire output more economically and with greater safety.

Downhill, as here—or up, with single flight lifts as high as 1500′—above ground or below, the G.T.M. can help you cut haulage costs. Ask him for dollars-and-cents proof established in hundreds of mining operations, or write Goodyear, Akron 16, Ohio.

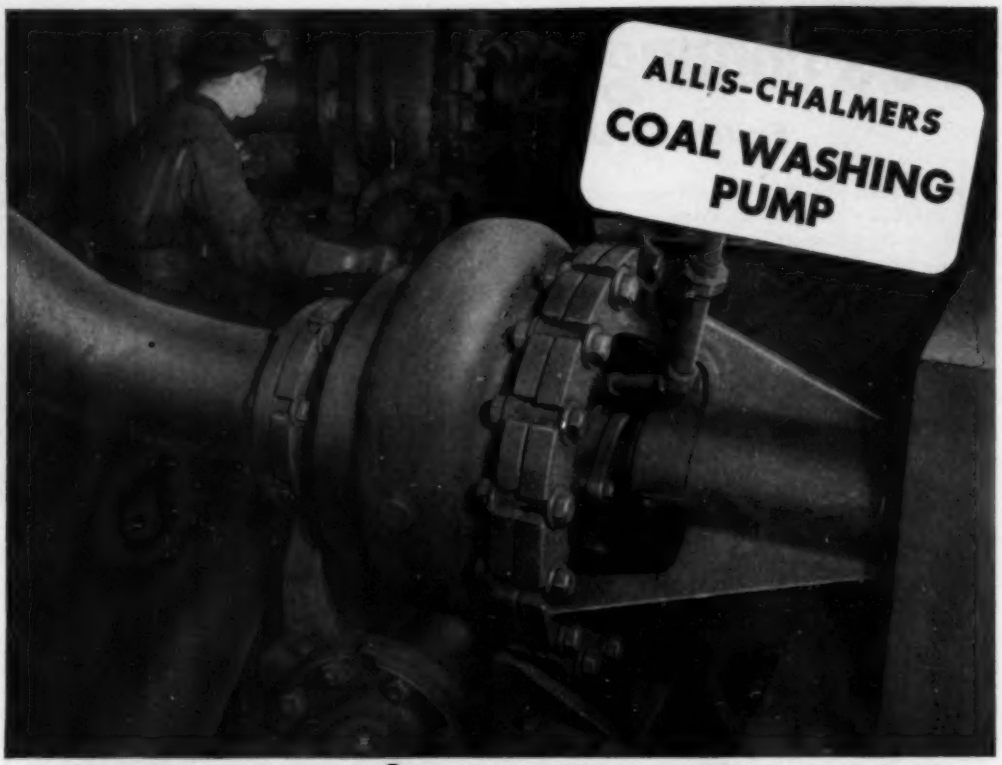

GOODYEAR INDUSTRIAL RUBBER PRODUCTS
GR-Specified DECLINE CONVEYOR Handling R. O. M. Coal for
ELK LICK COAL COMPANY
7° 45′ slope top end
297′ decline
16° 30′ slope on main run

FOR HOSE, FLAT BELTS, V-BELTS, MOLDED GOODS, PACKING, TANK LINING, RUBBER-COVERED ROLLS built to the world's highest standard of quality, phone your nearest Goodyear Industrial Rubber Products Distributor.

We think you'll like
"THE GREATEST STORY EVER TOLD"
Every Sunday – ABC Network

GOODYEAR

THE GREATEST NAME IN RUBBER



Operating Economy Brings Repeat Order

WHEN WEST KENTUCKY COAL COMPANY built a new preparation plant at their Pleasant View Mine, they chose Allis-Chalmers CW (Coal Washing) pumps. Why? Because three years of experience with these pumps at their East Diamond preparation plant had shown them how low operating costs are with Allis-Chalmers CW pumps.

Long Life Between Servicings

Users report up to four times longer life with Allis-Chalmers CW pumps because they are made of special hard *Allisite* alloy . . . because they have thicker sections and heavier parts . . . and because they are application engineered by specialists who know how to solve coal washing problems.

Replace Worn Parts In Half Hour

When worn parts must be replaced, the CW pump can be dismantled, an element replaced, and put back into service in less than a half hour. There are only five wearing parts, each made for easy handling and replacement. Piping need not be disturbed unless the casing is to be replaced.

Discuss your coal washing equipment problems with an A-C pump engineer. Call your nearest Sales Office or write Allis-Chalmers, Milwaukee 1, Wisconsin for Bulletin 08B6381.

ONLY FIVE WEARING PARTS

Shaft sleeve, impeller, casing, two wear plates. All easy to handle and easy to replace.

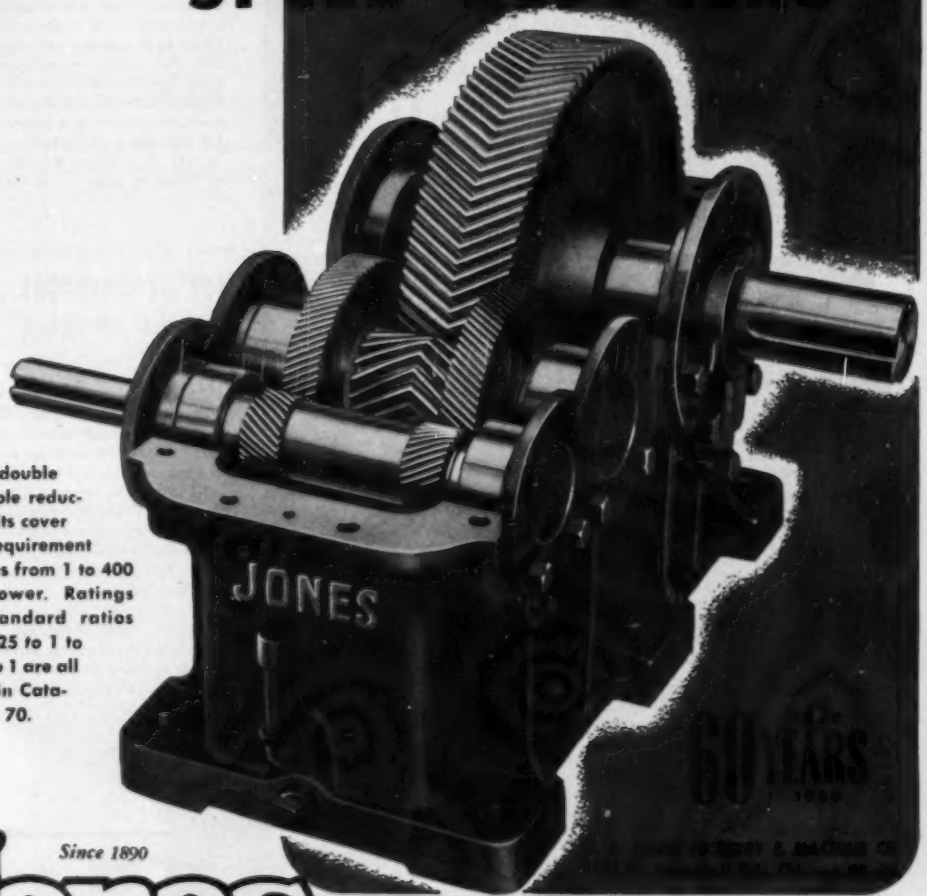
Allisite is an Allis-Chalmers trademark.

ALLIS-CHALMERS

A-2346

Jones

Herringbone SPEED REDUCERS



Single, double and triple reduction units cover every requirement in drives from 1 to 400 horsepower. Ratings and standard ratios from 1.25 to 1 to 355.8 to 1 are all shown in Catalog No. 70.

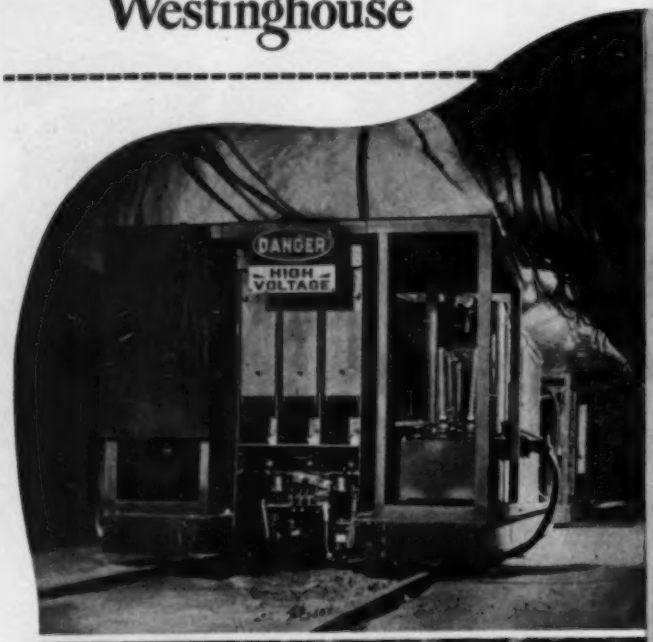
Since 1890

Jones

In The Service Of Industry

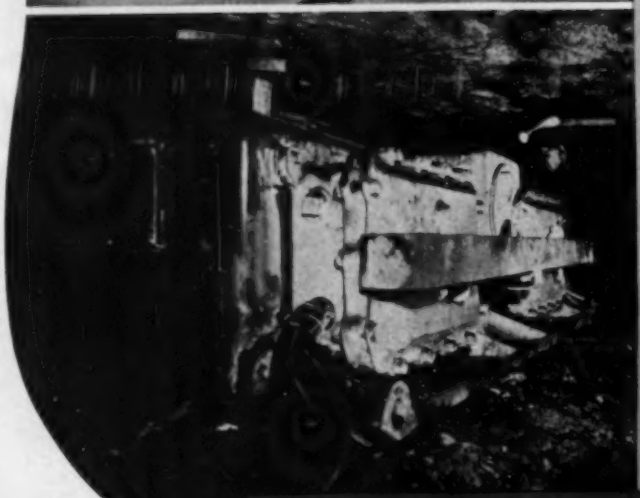
HERRINGBONE — WORM — SPUR — GEAR SPEED REDUCERS
CAST IRON PULLEYS • CUT GEARS • V-BELT SHEAVES
ANTI-FRICTION PILLOW BLOCKS • FLEXIBLE COUPLINGS

YOU CAN BE SURE.. IF IT'S
Westinghouse



FOR D-C OPERATIONS...
Ignitrons provide most economical power

Westinghouse-developed Ignitron Rectifier Substations offer outstanding advantages of portability, efficiency and low maintenance for main power supply in d-c mines. Mounted in three, low mine cars, they're readily portable so that power supply can be kept close to the work. (Stationary units are also available for surface operations.) High Ignitron efficiency saves about $5,000 per year in power costs alone in a typical 3000-kw operation. Maintenance is ⅔ that of M-G set. For more information write for B-4658.



FOR A-C OPERATIONS...
The safest transformer ever built

Here's the obvious answer to a-c mine power supply—the only Power Center actually designed for underground coal mining service. Skid it right up to the face, connect it and forget it. The Westinghouse Mine Power Center contains nitrogen-cooled transformer *with fireproof insulation* and feeder breakers in a compact, lightweight, easy-to-move unit only 25" high. There are no liquids to maintain. It is *completely explosion-proof*, and needs no special ventilation. Write for C.S. 48-380.

Westinghouse
EQUIPMENT FOR
THE MINING INDUSTRY

Is poor power supply wasting your money?

Efficient Mining Demands Adequate Power Where You Need It

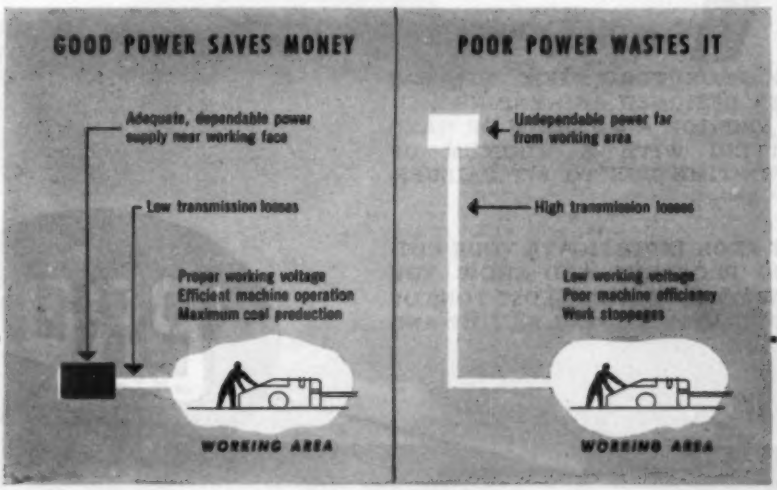
Here's how to avoid the costly consequences of power supply that's inadequate, undependable, or too far from the working face. With Westinghouse *mine-designed* Power Centers and Substations you do away with high transmission losses, low-working voltage, poor machine efficiency, overheated motors, work stoppages, high maintenance costs.

ANSWERS: WESTINGHOUSE MINE POWER CENTER, IGNITRON SUBSTATION

Westinghouse Ignitron Rectifier Substations for d-c mines and Mine Power Centers for a-c operations give you the power you need. Their operation is dependable and automatic. They're available in a wide range of ratings to deliver the volume of power needed. And most important, both are readily portable—compact, lightweight, easy to install and connect—so that power supply can be kept near the working face. This is essential. For example, by moving its power supply one mile closer to the working face, one new mine boosted production 23%—*with no increase in men or equipment.*

CHECK YOUR OPERATION; LET WESTINGHOUSE HELP

Make sure you're not wasting money that a good power supply would save. Study your operation. Westinghouse Mine Specialists will be glad to help—with no obligation, of course. Just call your nearby Westinghouse office. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-94847

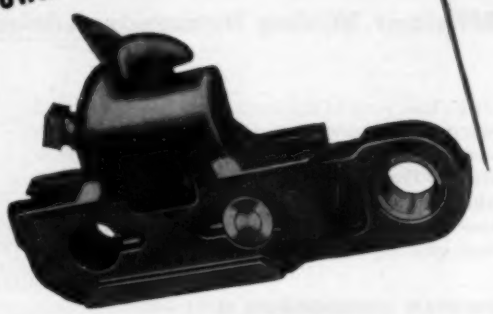


PROX

Cutting Chain and Bits

eliminate costly Breakdowns and Replacements

TONS PER MAN-DAY DEPEND UPON CONSISTENT OPERATION AT THE FACE. EQUIPMENT BREAKDOWNS HERE CAN BE COSTLY FAR BEYOND THE PRICE OF A NEW MACHINE OR OF NEW CUTTING BITS.



TOOL STEEL BIT

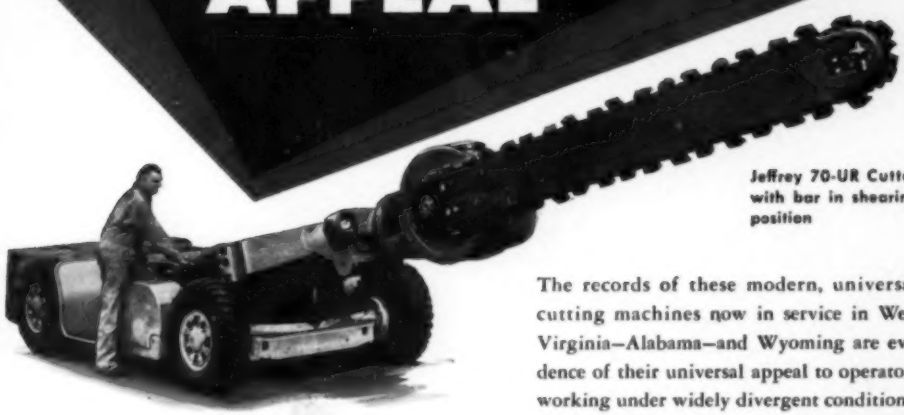
THE PROX TOOL STEEL BIT HAS BEEN DESIGNED AND ENGINEERED TO PROVIDE A MAXIMUM OF HARD CUTTING WITH A MINIMUM OF DOWN-TIME DUE TO BIT FAILURE.

LET PROX INVESTIGATE YOUR CUTTING PROBLEMS AND SHOW YOU HOW TO SAVE THOSE LOST TONS OF PRODUCTION AS WELL AS TIME AND MONEY.

PROX

ON THE BANKS OF THE WABASH

A UNIVERSAL CUTTER *with* UNIVERSAL APPEAL



Jeffrey 70-UR Cutter with bar in shearing position

The records of these modern, universal cutting machines now in service in West Virginia—Alabama—and Wyoming are evidence of their universal appeal to operators working under widely divergent conditions. Again, Jeffrey is living up to its reputation for building dependable, cost-saving equipment . . . this time in the field of trackless mining.

JEFFREY

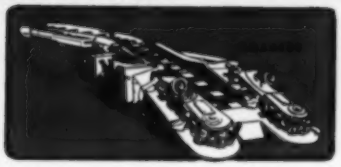
Jeffrey 70-UR Cutter with bar in top cutting position

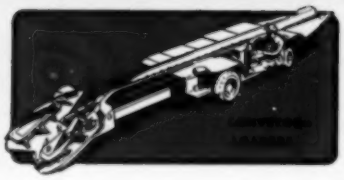
Call in a Jeffrey Mining Engineer for help on your cutting and other mining problems . . . take advantage of Jeffrey experience, engineering "know-how" and complete manufacturing facilities.

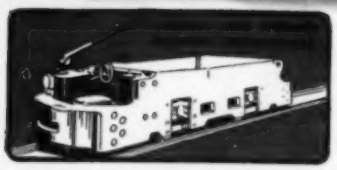
70-UR

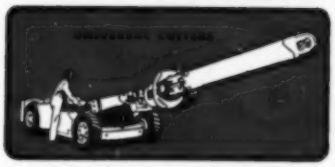
Jeffrey 70-UR Cutter with bar in bottom cutting position

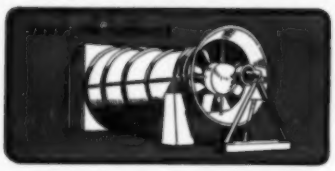
(Patented. Also licensed under E. C. Morgan Pat. 1,953,325)

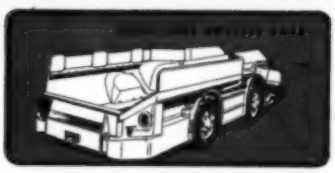


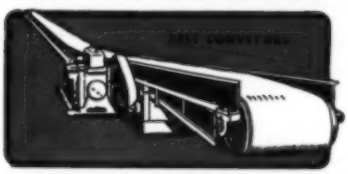












JEFFREY

EQUIPMENT FOR COAL MINES

THE JEFFREY MANUFACTURING COMPANY

Established 1877

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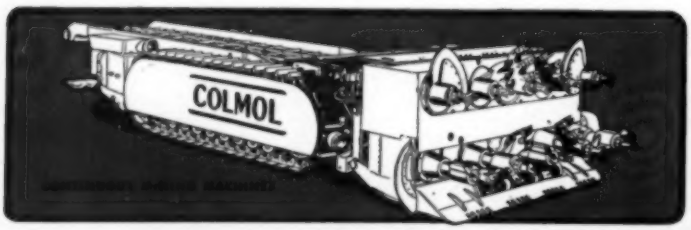

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*THE DRYING DUTCHMAN

(THE REINEVELD CENTRIFUGAL DRYER)

This compact, highly efficient, precision-built, time-tested and proven machine is now available to American and Canadian Coal Industries through the agency of Heyl & Patterson.

More than 250 of the Dryers have been placed in successful operation during the past 20 years on extremely difficult jobs in European Coal Cleaning Plants.

The installations that have been made in the United States have won wide acclaim. Here are some of its outstanding features:

Less degradation of coal . . . Less Floor Space (6 ft. x 6 ft.) . . . Less total height (5 ft. 6 inches) . . . Less weight (11,000 lbs.) . . Lower moisture in dried coal (5-7%) . . . Capacity 50-75 tons per hour (¼ x 0) . . . Lower installation costs . . . Lower maintenance costs.

COMPLETE STOCK OF REPAIR PARTS GUARANTEED

We are in a position to supply any Repair Part in Pittsburgh, Pa., and can guarantee the same availability and service that have been a Heyl & Patterson Standard for more than 60 years.

WRITE FOR YOUR COPY OF H&P BULLETIN NO. 2-51

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Heavy Bulk Materials Handling Equipment
All the Way from Design to Erection

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See the
Drying Dutchman
in the
Heyl & Patterson Exhibit
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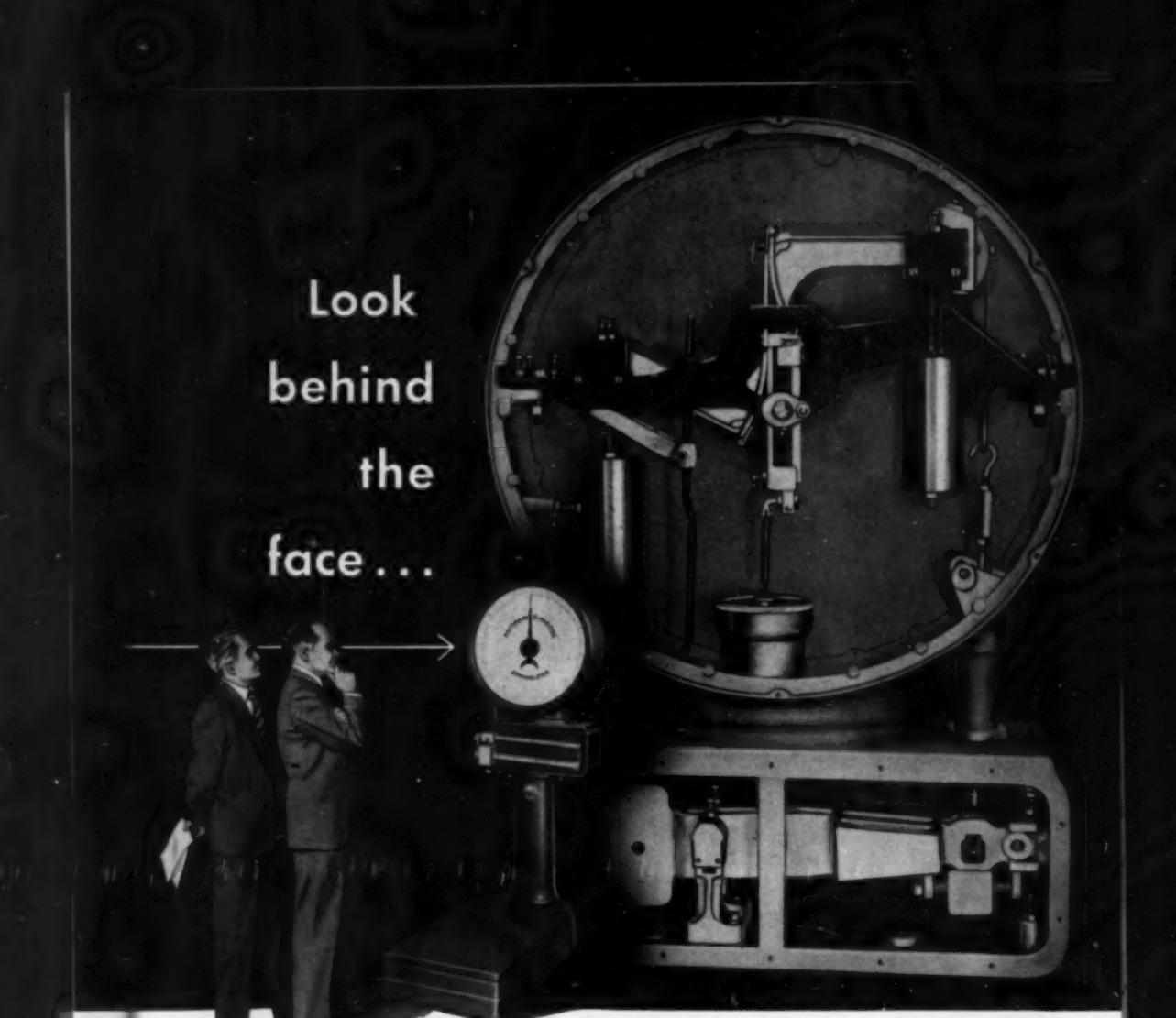

to see | sustained scale accuracy

What determines *sustained* accuracy in a dial scale? Simplicity and durability of the functional parts! And that's exactly what you get in Fairbanks-Morse Dial Scales.

Looking behind the dial face, as illustrated, you can see the simplicity, the durability that is inherent in all Fairbanks-Morse Dial mechanisms. The compensating double pendulums swing in opposite directions. If the scale should be tilted due to unlevel conditions, the decreased pull on one pendulum will compensate for the increased pull on the other. You get *sustained* accurate weighing.

Pendulum movement, when counter-balancing the platform load, is transferred through a *precision-cut* rack and pinion to a knife edge indicator. Indicator travels over a graduated chart where pendulum movement is translated into units of weight representing the correct platform weight.

Note the small number of moving parts. That's design simplicity. Fewer moving parts mean less chance for trouble . . . less chance for inaccuracies.

Durability of parts is hard to see in a photo, but the thousands of Fairbanks-Morse Dial Scales in successful daily service over many years are proof of durability . . . and *sustained* accuracy. Why not have your nearest Fairbanks-Morse weighing expert give you the complete story or help you with your weighing problems? Fairbanks, Morse & Co., Chicago 5, Ill.

FAIRBANKS-MORSE,

a name worth remembering

SCALES • PUMPS • ELECTRIC MOTORS
GENERATORS • LIGHT PLANTS • DIESEL,
DUAL FUEL AND GASOLINE ENGINES

MORE AMPERES CAN RIDE THESE CABLES

You can do yourself and our country a service by installing Simplex-ANHYDREX XX Cables wherever you need to replace high voltage power cable.

Here's why. You can crowd more amps into the same size copper when it is insulated with Simplex-ANHYDREX XX. That's how you save copper. Of course your cables will run hotter but that's all right with Simplex-ANHYDREX XX insulation. This insulation is built to withstand 75°C. to 80°C. (167°F. to 176°F.), depending on operating conditions.

Simplex-ANHYDREX XX Insulated Cables can be used underground, directly in the earth, or in ducts, or they can be used overhead as aerial cables. The special Simplex neoprene jacket protects these insulated conductors from sunlight, oil, acids, alkalies, etc.

Want to know more about this versatile high temperature, high voltage power cable insulation that really combats moisture and water? Then return the coupon. No obligation, of course.

Simplex-ANHYDREX XX is a product of Simplex Research

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ROLLER BEARINGS

Longer Lasting! Better Performance! More Economical!

Here's a low-cost bearing that's an efficient companion to Rollway's famous bronze retainer bearings. It's been thoroughly tested and proved . . . gives remarkable performance where there has to be just the right balance between the economy and precision factors of bearing selection.

TRU-ROL Bearings feature Rollway's exclusive "Guide Lips"—curved, broad flanges in the steel retainer pockets that guide the rollers in perfect alignment and keep them properly lubricated.

TRU-ROL design and construction assure precision operation . . . and long, dependable service . . . *at a considerable saving.* Specify Tru-Rol . . . and obtain the high standards of workmanship and materials that have distinguished Rollway Bearings for more than 40 years.

Engineering Service...

If you have a particular problem, contact us. A Rollway engineer will be available for consultation with you—without obligation, of course.

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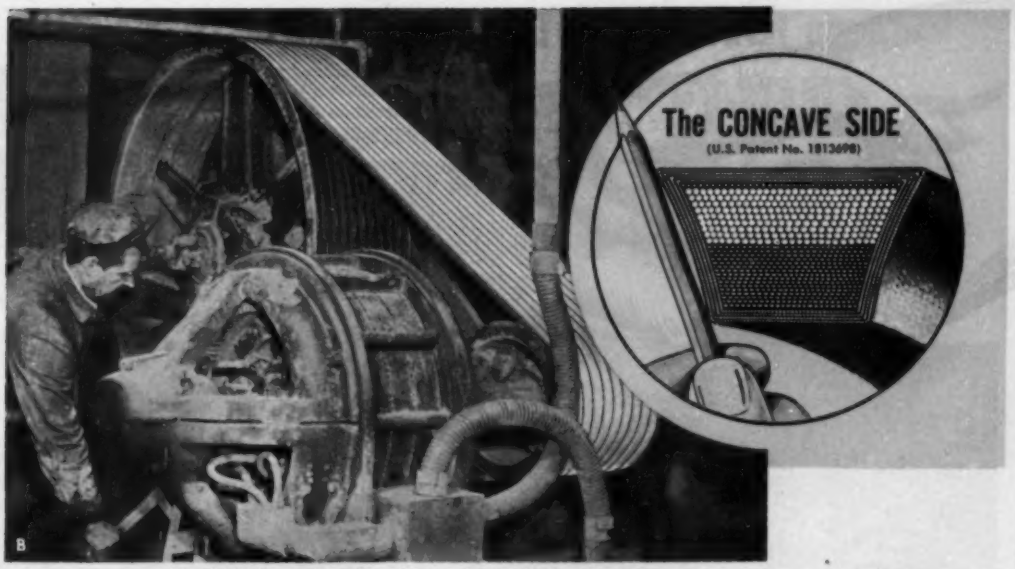


This 36"x 42" jaw crusher of Canadian Quarries, Ltd., Montreal, Quebec, used to be driven by a double reduction flat belt drive. Mr. Pierre Manseau, Master Mechanic, says that the Gates Vulco Rope Drive shown, "has reduced our maintenance costs by about $1000 per year and we were also able to increase production by fifty tons per hour."

This test shows how the Concave Side gives you a real saving in V-Belt costs

If you are interested in lower operating costs, make this simple test:—

Take *any* V-belt and bend it as it bends in going around a pulley. As the belt bends, grip its sides with your fingers and thumb. You will *feel* the sides of the belt *bulge out!*

This bulging gives a straight-sided V-belt the shape shown in figure 1-A. (See diagrams at right.) Clearly, this shape does not fit the sheave groove. The sides of the bulging belt are forced to press unevenly against the V-pulley—and this concentrates the *wear* along the *middle* of the sides.

But when you bend a V-belt that is built with the *Concave Side*, you find that the sides become perfectly straight—as shown in Figure 2-A. This shape precisely fits the sheave groove.

Because there is *no bulging*, the sides of the Gates Vulco Rope always grip the *full* face of the V-pulley *evenly* and therefore wear *uniformly*—resulting in *longer belt life* and *lower belt costs for you.*

What Happens When a V-Belt Bends

How Straight-Sided V-Belt Bulges in Sheave-Groove. Sides Press Unevenly Against V-Pulley Causing Extra Wear At Point Shown by Arrows.

The Concave Sides Fill Out to a Precise Fit in the Sheave Groove. No Side Bulge! Sides Press Evenly Against the V-Pulley—Uniform Wear—Longer Life!

Only V-belts made by Gates are built with concave sides. Whenever you buy V-belts, be sure you get the V-belt with the Concave Sides—The Gates Vulco Rope!

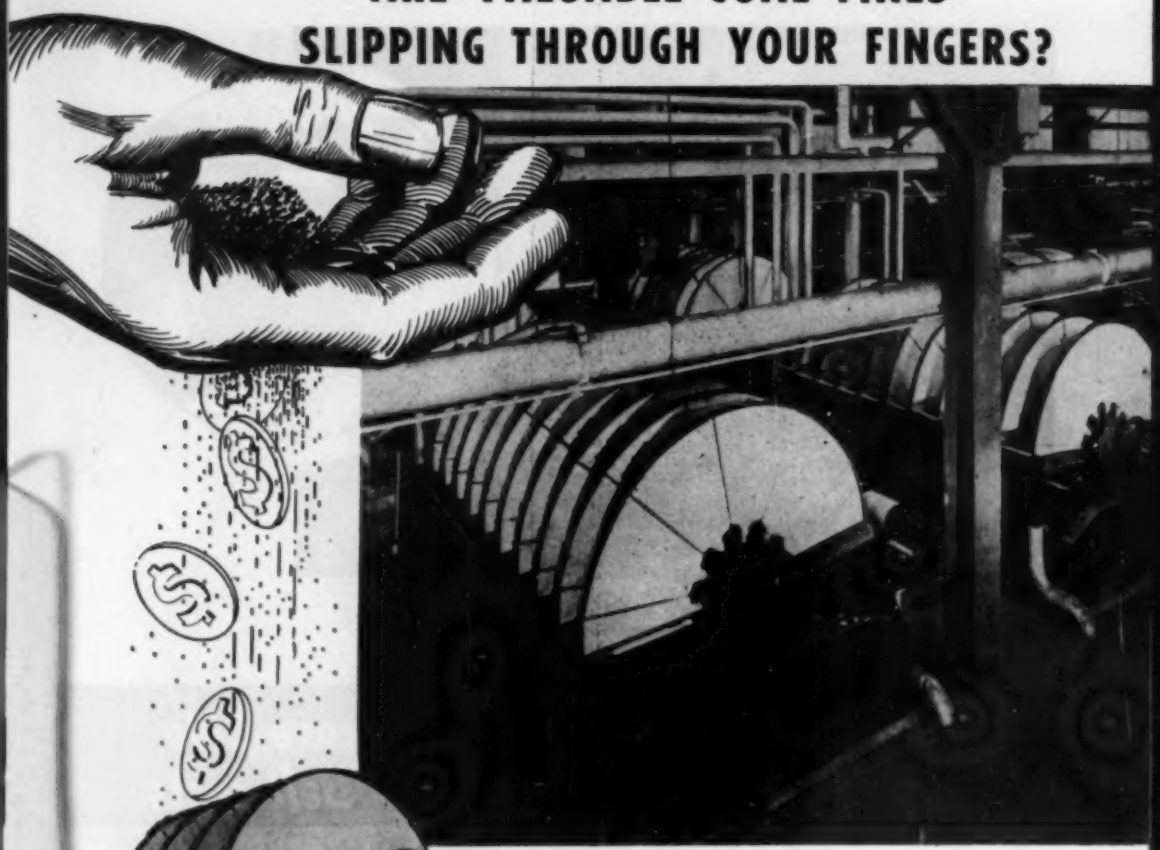
CS-514

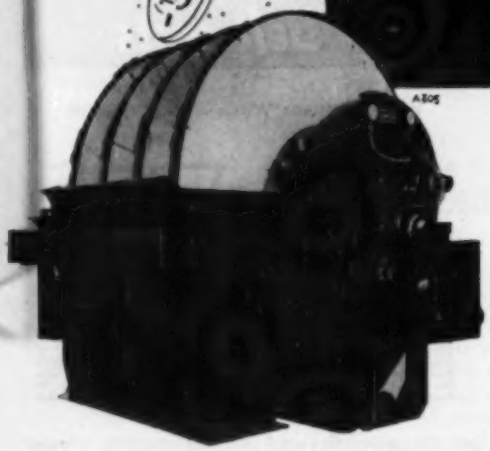
Gates
Hose V-Belts Molded Rubber Goods for Industry

VULCO ROPE DRIVES
ENGINEERING OFFICES AND JOBBER STOCKS IN ALL INDUSTRIAL CENTERS

THE GATES RUBBER COMPANY
DENVER, U. S. A.
The World's Largest Makers of V-Belts

ARE VALUABLE COAL FINES SLIPPING THROUGH YOUR FINGERS?





Coal fines can be a profitable item when dewatered on an Eimco Filter. Fast separation with efficient drying assures users of maximum production from each square foot of filter area.

Eimco will produce a clear filtrate which will not be objectionable in States where anti-pollution laws exist.

As a free service to companies considering the use of coal saving equipment we invite you to send samples to our complete filtration laboratory for a test in filterability — write for shipping instructions.

It will be a privilege for an Eimco engineer to consulte with you on filtration problems.

EIMCO

THE EIMCO CORPORATION

The World's Largest Manufacturers of Underground Rock Loading Machines

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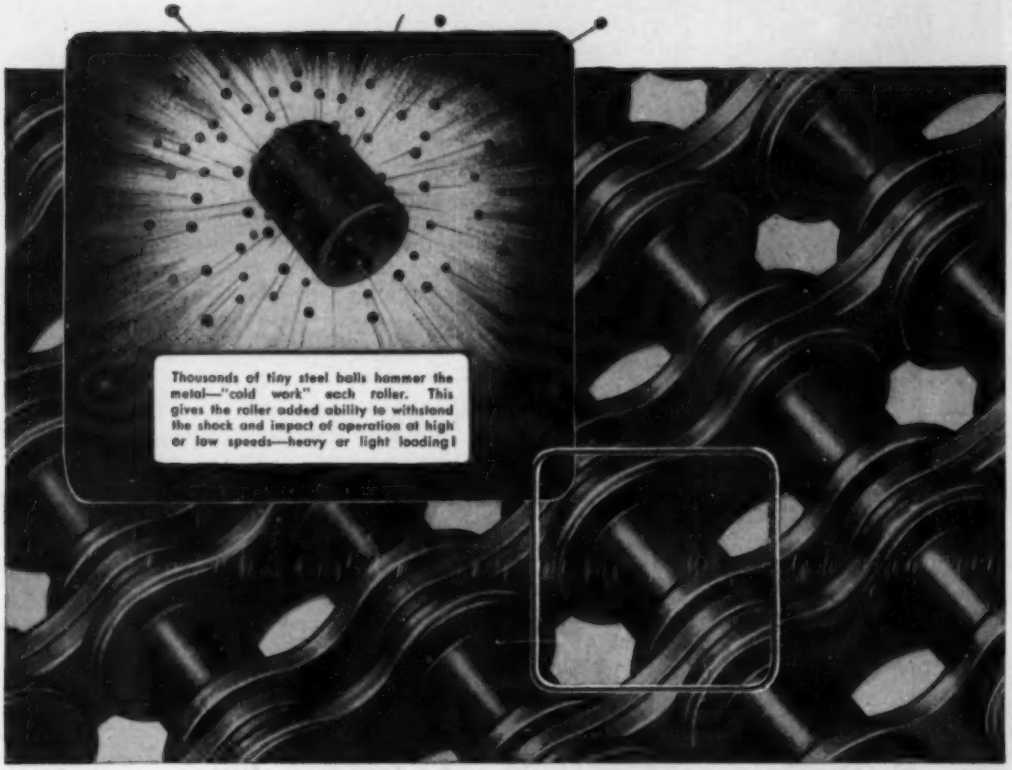
AGENTS IN ALL PRINCIPAL CITIES THROUGHOUT THE WORLD

You can't beat an Eimco!

Get the roller chain with rollers that are

SHOT PEENED

for EXTRA fatigue life!


Thousands of tiny steel balls hammer the metal—"cold work" each roller. This gives the roller added ability to withstand the shock and impact of operation at high or low speeds—heavy or light loading!

You get this added feature in every LINK-BELT Roller Chain

You get absolute uniformity, too. No highs. No lows. Just smooth, flowing dependable chains that pay off in wide flexibility—greater performance—longer life.

You see, LINK-BELT Roller Chains are made from carefully selected materials with controlled heat treatment to assure uniformity and absence of weak members, then—rollers are shot peened to give them the extra fatigue life needed for today's higher speeds and heavier loads.

Link-Belt Roller Chain is available in single or multiple widths, in ⅜" to 3" pitch and double pitch. If you have a roller chain problem, see the LINK-BELT engineer nearest you.

LINK-BELT

ROLLER CHAINS and SPROCKETS

LINK-BELT COMPANY. Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Johannesburg. Offices, Factory Branch Stores and Distributors in principal cities. 12.207

'Exclusively Designed'* for Big Output

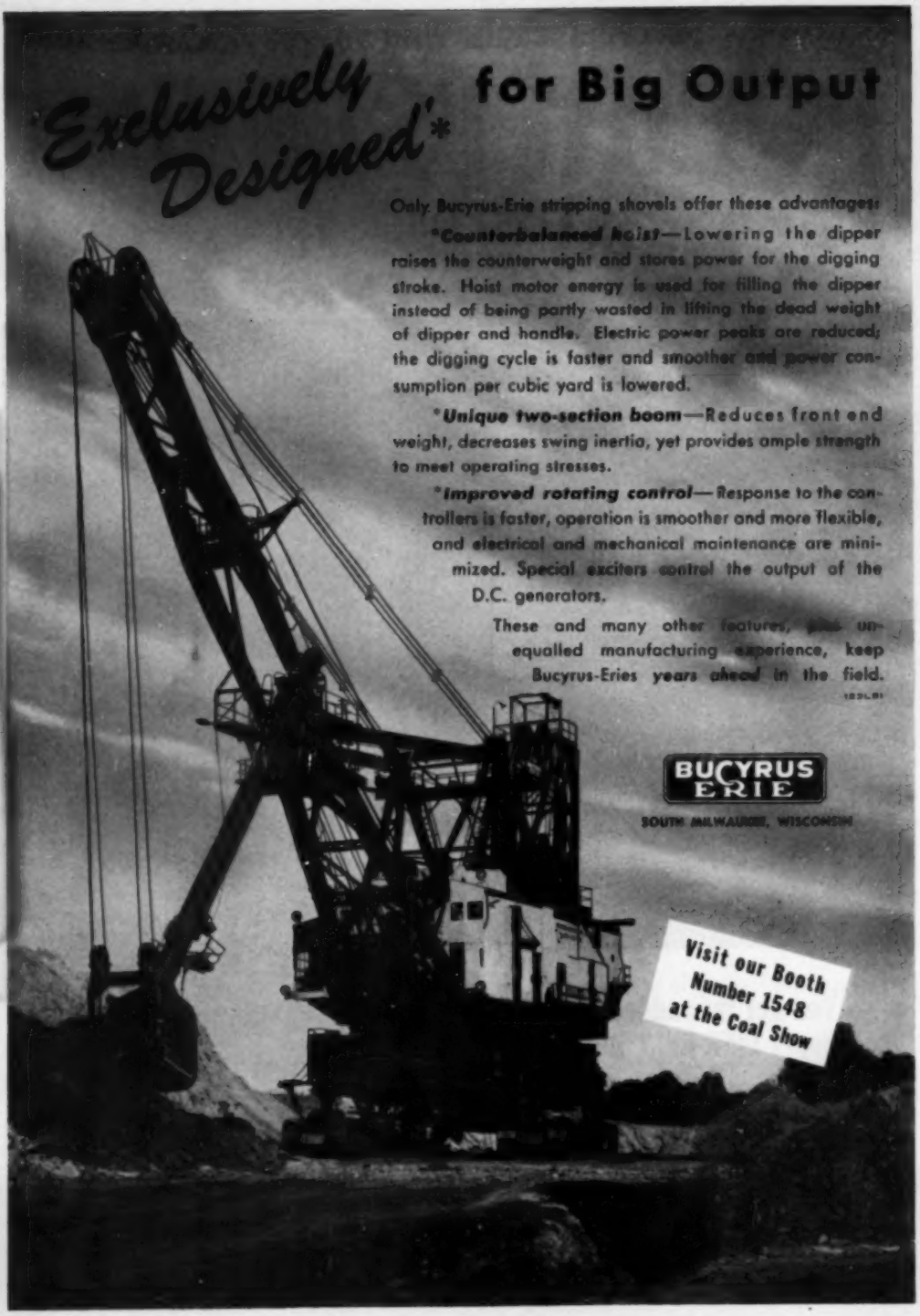
Only Bucyrus-Erie stripping shovels offer these advantages:

***Counterbalanced hoist**—Lowering the dipper raises the counterweight and stores power for the digging stroke. Hoist motor energy is used for filling the dipper instead of being partly wasted in lifting the dead weight of dipper and handle. Electric power peaks are reduced; the digging cycle is faster and smoother and power consumption per cubic yard is lowered.

***Unique two-section boom**—Reduces front end weight, decreases swing inertia, yet provides ample strength to meet operating stresses.

***Improved rotating control**—Response to the controllers is faster, operation is smoother and more flexible, and electrical and mechanical maintenance are minimized. Special exciters control the output of the D.C. generators.

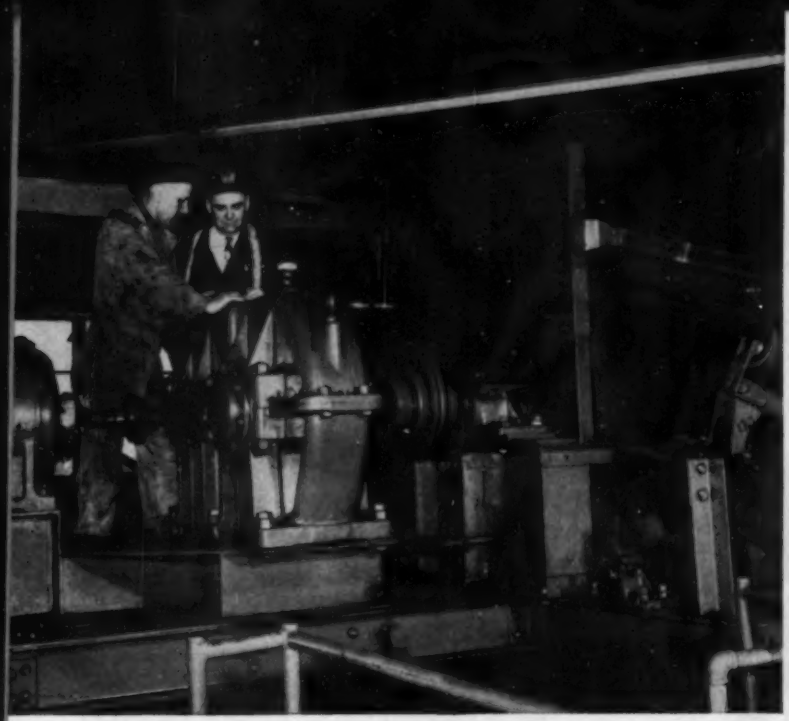
These and many other features, plus unequalled manufacturing experience, keep Bucyrus-Eries *years ahead* in the field.



BUCYRUS ERIE

SOUTH MILWAUKEE, WISCONSIN

Visit our Booth Number 1548 at the Coal Show



Keeps speed reducers geared to greater tonnage . . .

A MIDWEST SURFACE MINE has processed an average of some 4,000 tons of coal per day in its large preparation plant. The continuous high output of this plant has been largely a result of decisions made two years ago by officials of this mine.

At that time, the preparation plant was put into operation. One of the decisions made by the mine operators was based on the recommendation of a Standard Oil lubrication specialist. The operators gave STANOIL Industrial Oil the important job of lubricating gear reduction units used in driving the processing equipment.

In the two years of operation, no cleaning of the reduction units has been necessary. Although changed each year as a matter of routine, STANOIL has shown no deterioration in service. Gear teeth have remained in excellent condition. Moreover, plant operators report that with the use of STANOIL there have been no heavy starting loads due to the oil's thickening at low temperatures.

STANOIL
TRADE MARK
Industrial Oil

You can simplify your mine lubrication jobs by using STANOIL Industrial Oil. It provides cleaner operation of loader and crane hydraulic units, supplies effective lubrication in compressors, gear cases, and circulating systems.

To assure you of maximum benefits from STANOIL and other high-quality petroleum products, the Standard Oil Company has a well-trained and experienced lubrication specialist near your plant. To obtain his prompt and expert services phone your local Standard Oil Company (Indiana) office, or write to: Standard Oil Company (Indiana), 910 S. Michigan Avenue, Chicago 80, Illinois.

What's YOUR problem?

Fred A. Barnes is the lubrication specialist who advised this midwest mine to use STANOIL in its speed reducers to safeguard gear teeth. With headquarters in Standard Oil's Decatur office, he was able to give prompt attention to the problem posed by the mine operators.

There's a Standard Oil lubrication specialist located near your mine. He's one of a corps of highly trained, experienced men throughout the midwest, and he's ready to help you make significant savings.

Arrange now for the visit of the lubrication specialist serving your area. Just phone or address a card to the nearest Standard Oil Company (Indiana) office. Ask him to explain the advantages of these other Standard petroleum products:

SUPERLA Mine Lubricants—These new, improved oils and greases provide better lubrication of cutters, loaders, locomotives, mine cars, and other underground equipment. They eliminate transmission-case deposits, reduce clutch-plate gumming, and minimize wear on gears and bearings.

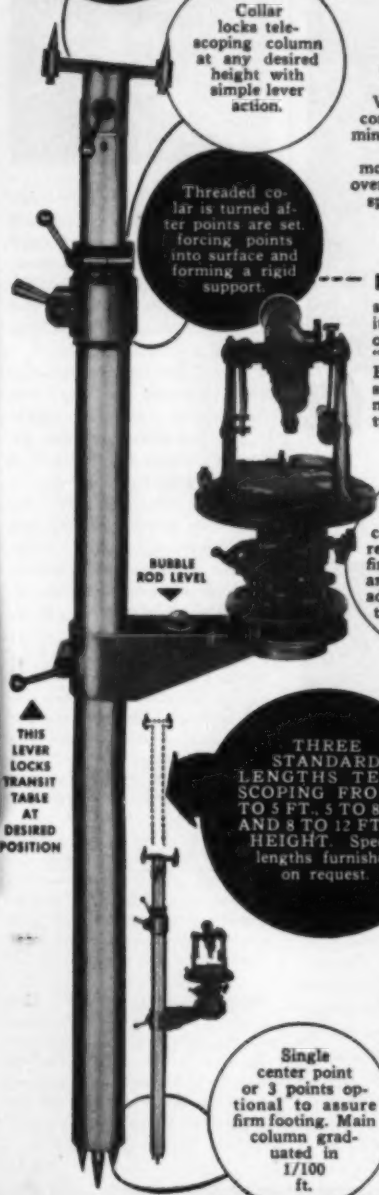
CALUMET Viscous Lubricants—On open gears and wire rope, these greases resist washing and throw-off. Their superior wetting ability affords better coating of gears and better internal lubrication of wire rope.

SUPERLA Greases—Available in lime soap and soda types, SUPERLA Greases cover a wide range of applications. These products are comparable in quality to the highest type of special greases but are as readily available and economical as ordinary cup greases.

STANDARD OIL COMPANY (INDIANA) STANDARD

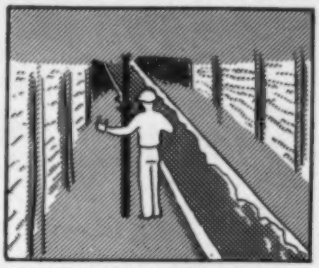
BOWDIL'S TELESCOPING TRANSIT SUPPORT...

SEE IT AT THE COAL SHOW — BOOTH 1006


Double pointed foot swivels to conform with uneven surface. Locks in position.
Collar locks telescoping column at any desired height with simple lever action.
Threaded collar is turned after points are set, forcing points into surface and forming a rigid support.
Transit table has threaded collar which will receive and hold firmly any standard transit, with adapters furnished to fit your transit base.
BUBBLE ROD LEVEL
THIS LEVER LOCKS TRANSIT TABLE AT DESIRED POSITION
THREE STANDARD LENGTHS TELESCOPING FROM 3 TO 5 FT., 5 TO 8 FT. AND 8 TO 12 FT. IN HEIGHT. Special lengths furnished on request.
Single center point or 3 points optional to assure firm footing. Main column graduated in 1/100 ft.

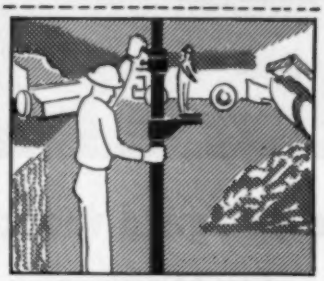
IN CONVEYOR MINES

the edge of the conveyor is usually placed on the surveyor's sight line. With conventional tripods the entire conveyor must be shut down and the mine inactivated. With the Bowdil support the post is set up close to the moving conveyor and the table is swung over the edge. Rigid support and small space required permits surveying while mine is in operation.



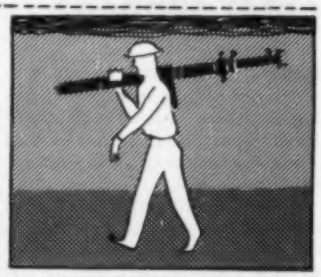
IN OTHER TYPES OF MINES

such as track or rubber mounted types, it is often necessary to move quickly out of the way of an approaching "trip". In a matter of seconds the Bowdil Transit Support can be telescoped, by releasing one clamp, and moved aside. An important safety feature is the contact between floor and roof. A glance at the transit level serves to warn the surveyor of any roof movement which might mean a cave-in.



IT'S LIGHT-WEIGHT

and sturdily constructed of aluminum and stainless steel. Even the largest standard size, which is 8 ft. long in its closed position, can be carried easily by one man.

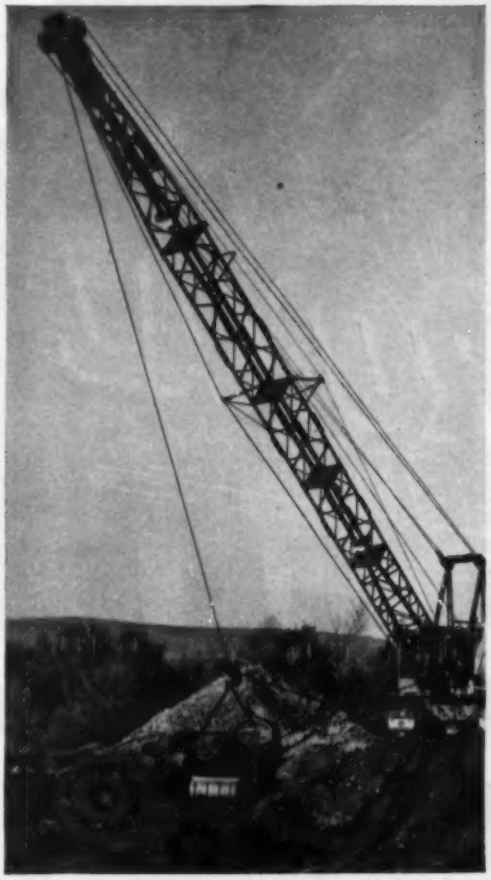


IT'S VERSATILE

not only because the transit table can be reversed on the main column allowing the transit to be raised or lowered to any desired height, but also because of its advantageous use in sewer survey, tunnelling, building construction and in any field of work where an overhead surface is available.

The **BOWDIL CO.** CANTON, OHIO

WIRE ROPE



You PAY for the best . . .
make sure you GET it . . .
always specify Roebling

YOU PAY FOR THE BEST when you buy wire rope. And you *get the best* when you buy Roebling Preformed "Blue Center" Steel Wire Rope. "Blue Center" steel is an exclusive Roebling product . . . gives rope the extra toughness that spells long life . . . service economy that really counts. Besides that, Roebling Preformed always spools better . . . reduces vibration and whipping . . . doesn't tend to set or kink.

Roebling makes a wide range of wire rope . . . brings you the right construction, grade and size for top performance and economy on each installation. Have your Roebling Field Man help select the *best* rope for your particular requirements. And for maximum savings, get his suggestions on the proper use and maintenance of wire rope. He knows the case histories of thousands of installations. John A. Roebling's Sons Company, Trenton 2, New Jersey.

ROEBLING

Atlanta, 934 Avon Ave ★ **Boston,** 51 Sleeper St ★ **Chicago,** 5525 W. Roosevelt Rd ★ **Cincinnati,** 3253 Fredonia Ave ★ **Cleveland,** 701 St. Clair Ave, N.E. ★ **Denver,** 4801 Jackson St ★ **Houston,** 6216 Navigation Blvd ★ **Los Angeles,** 216 S. Alameda St ★ **New York,** 19 Rector St ★ **Odessa, Texas,** 1920 E. 2nd St ★ **Philadelphia,** 230 Vine St ★ **San Francisco,** 1740 17th St ★ **Seattle,** 900 1st Ave, S. ★ **Tulsa,** 321 N. Cheyenne St

The Only Such Mining Tire in the World!

★ *Tread Compounds to Fit Your Exact Requirements!*

★ *Job-Fitted and Actually Designed for the Mining Work It Must Do!*

★ *Entirely New Inner Cavity Form*—Built and round-moulded to the tire's inflated shape! Scientifically designed for today's wide-based rims. Reduces shoulder strain, tread and carcass stress.

★ *Extra Tread Depth with a Thicker Under-Tread!*

★ *Cuts Costs* from the First Mile of Service!

★ *Gives You An Entirely New Combination Of Off-The-Road Traction* with *Non-Skid, Long-Wearing Roll* On the Highway!

★ *You Get 50% More Actual Miles*—70% Deeper Traction Tread!

A phone call does it—to your nearest U. S. Royal Dealer. He's listed in the Classified Telephone Book.

UNITED STATES RUBBER COMPANY

MACK TRUCKS

Get Things Done!

● Extra effort—that's the order of the day as American industry swings into high gear to meet the growing demands of the nation's expanding defense program.

Nowhere is this more important than on vital construction work and on the job of keeping raw materials flowing from the mines, the forests and the oil fields.

Here's work that's cut out for Mack trucks... jobs where big Macks show at their best in *extra* strength and stamina, *extra* performance and *extra* dependability.

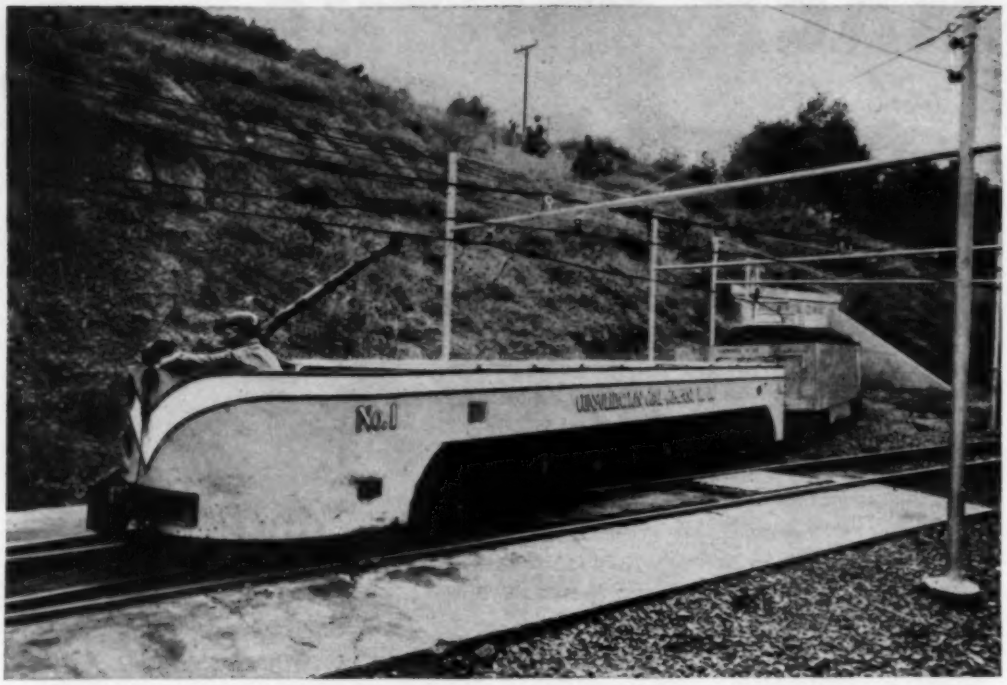
Your nearest Mack branch or distributor will show you how Mack's exclusive design and construction can boost output on your particular job... *get things done* faster and at lower cost. You'll find it's a story well worth hearing.

Mack TRUCKS

...outlast them all

Mack Trucks, Empire State Bldg., New York 1, New York. Factories at Allentown, Pa.; Plainfield, N. J.; Long Island City, N. Y. Factory branches and distributors in all principal cities for service and parts. In Canada: Mack Trucks of Canada, Ltd.

Model LRSW six-wheel SUPER MACK truck really "gets things done" in strip mining and excavating work—handles its 30-ton loads with round-the-clock dependability.



G-E MINE LOCOMOTIVES

get more coal out faster and

STAY ON THE JOB

The top availability of sturdy, powerful G-E mine locomotives means that you can depend on them to bring the coal out—day after day, load after load. G-E locomotives are built for the job and stay on the job because their rugged, carefully engineered construction gives them staying power and requires little maintenance.

Long intervals between overhauls cut down operating expense. There are fewer parts which need regular maintenance and these can be serviced quickly and easily. Equalized spring suspension lessens track wear. Balanced design enables G-E locomotives to hug the rails at top speed. Smooth pickup permits operation close to the slippage point, increasing the load that can be started.

High availability, low maintenance costs, greater protection for the operator mean that G-E locomotives can do your hauling job better. Call your G-E representative. He'll show you how the right General Electric mine locomotives will do your job with savings in cost and time. General Electric Company, Schenectady 5, N. Y.

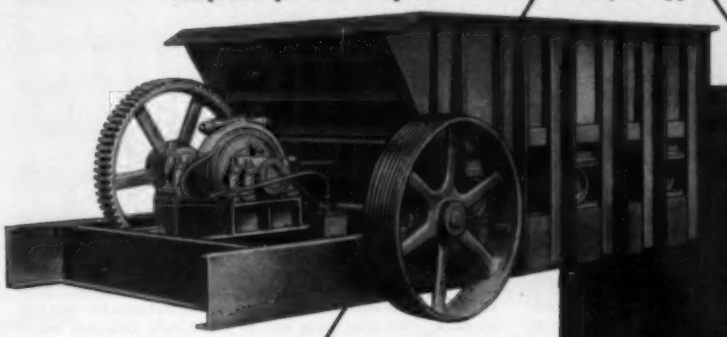
GENERAL ELECTRIC

130-54

A Great Combination..

For Low Cost Handling and Crushing Operations!

A combination of McLanahan Reciprocating Plate Feeder and Rockmaster Crusher is your answer to most economical feeding and crushing of 1000 tons or more of limestone, ore or rock per hour. Equipment can be furnished as component parts or as separate units to best suit your application.



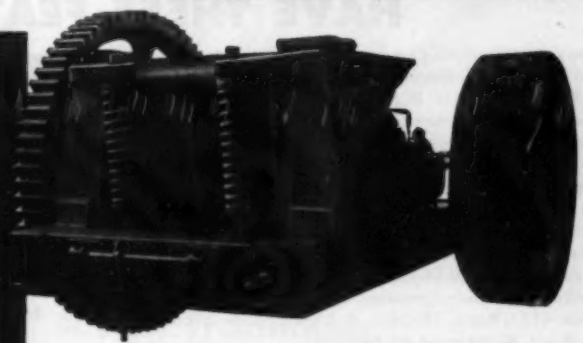
1

Heavy Duty

Built to handle materials from the size of sand to shovel-loaded rock, McLanahan Adjustable Reciprocating Plate Feeders automatically control the rate of flow of material, and are quickly adapted to the producing capacity of any machine.

2

Single Roll

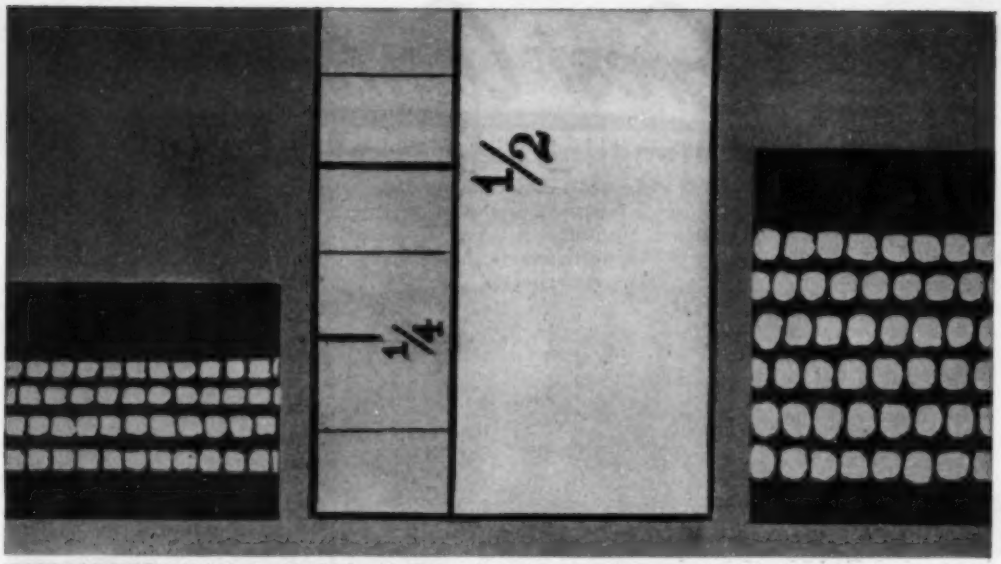


The McLanahan Rockmaster Crusher is the economical solution to most any crushing problems. Greatest savings can be achieved by this combination of equipment. Outstanding for primary and secondary crushing operations, for use on limestone, gypsum, rock, gravel, shale, iron ore, slag and other materials.

Write Today
For Bulletins
RM-505 and FRE-4812

McLANAHAN & STONE CORPORATION
Pit, Mine and Quarry Equipment Headquarters
Hollidaysburg, Pennsylvania

Dependable Products: Single and Double Roll—and Jaw Crushers, Crushing Plants, Reciprocating Plate and Apron Feeders, Roll Grizzlies, Conveyors, Elevators, Screens, Scrubbers, Stool Log Washers, Sand Drags, Hoists, Jigs, Dry Pans, Dryers, Scrap Bundlers, Pulleys, Gears, Bearings, Sprockets, Sheaves, Rollers, Bin Gates, Elevator Buckets, Gratings, Car Wheels, Ferrous and Bronze Castings.



GREATER STRENGTH of belts built with "Cordura" is illustrated above (enlarged in scale to show detail of construction). At left is cross-section of four-ply belt sinewed with "Cordura." It's stronger than conventional six-ply belt at right, yet only half as thick. This thin, light belt is particularly desirable where panel equipment is moved frequently.

WILL YOUR NEXT CONVEYOR BELT HAVE THESE FEATURES?

Here are four operating advantages you can have built in your next conveyor belt simply by asking your supplier to build it on Du Pont Cordura* High Tenacity Rayon. This is the industrial yarn that gives strength to heavy-duty truck tires and lightweight high-pressure hose. And it makes a stronger and easier-to-operate belt . . . at no extra cost.

We will be glad to send you the names of suppliers of these efficient belts. You can also get full information about "Cordura" in the new manual "Sinews for Industry." It gives physical properties of "Cordura" rayon, describes many successful applications and tells how "Cordura" improves the efficiency of conveyor systems. For your free copy, address Room 4527, Rayon Division, E. I. du Pont de Nemours & Co. (Inc.), Wilmington 98, Delaware.

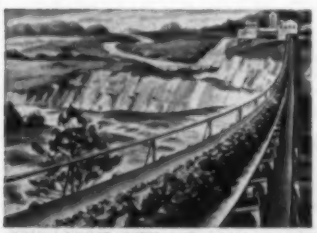
*Reg. U. S. Pat. Off.

DU PONT "CORDURA" HIGH TENACITY RAYON

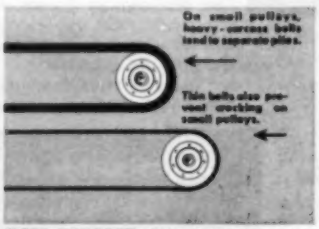
DU PONT

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

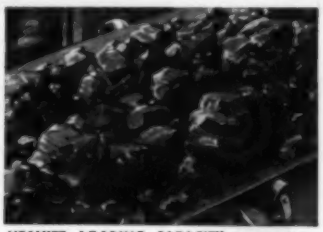
for RAYON... for NYLON... for fibers to come look to DU PONT



SPAN LONGER LIFTS. The high tensile strength of "Cordura" rayon eliminates costly transfer points. For example, a belt reinforced with seven plies of "Cordura" can lift 1000 tons of overburden per hour up a 15° slope over 1000-foot centers. It has design tension of 900 pounds per inch of width.



MORE FLEXIBILITY. Belts built with "Cordura" have less tendency to crack and separate plies when run over small pulleys required in confined working space. And belts built with "Cordura" have less stretch, so less take-up room is needed. And they trough well under any loading conditions.

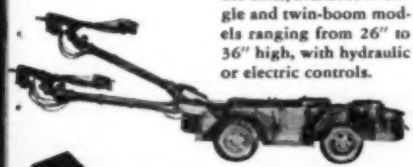


HEAVIER LOADING CAPACITY is possible on conveyor belts built with Du Pont "Cordura" High Tenacity Rayon. This yarn is inherently stronger than the natural fibers commonly used. It packs extra strength into conveyor belts and enables them to carry loads to the capacity of power equipment.

Speed-Up Drilling-Cut Costs!

JOY MOBILE COAL DRILLS

CD-26 TWIN-BOOM COAL DRILL



JOY Mobile Coal Drills are self-propelled, flexible units, available in single and twin-boom models ranging from 26" to 36" high, with hydraulic or electric controls.

SULMET Carbide-Tipped Auger Bits cut *FASTER—LAST LONGER*

- ★ **Highly Maneuverable**
- ★ **Fast Tramming**
- ★ **Automatic, Infinitely Variable Control of Rotation and Feed**
- ★ **Built in 26", 30" and 36" Heights**

Write for Bulletins, or *Consult a Joy Engineer*

WOD CL 2019

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

12-RB CUTTER

A rubber-tire mounted, mobile, fast-tramming cutting machine only 26" high, supplied either as a bottom or top cutter. For slabbing, the cutter bar swings 90° to either side. Bar tilt, roll, and lift are fully hydraulically controlled. Hydraulic steering provides extra flexibility for easy maneuvering. 50 HP cutter motor provides ample capacity to keep ahead of the loader; separate motor drives the hydraulic pump.

20-BU-1 LOADER

Overall height is only 24", yet this machine can load up to 8 tons per minute. Employs the exclusive JOY loading principle, also a new JOY development: the conveyor is driven independently of the gathering arm drive. This makes possible continued operation of the gathering head while a shuttle car is away, to provide a fully loaded conveyor for quick loading of the car when it returns. Also permits continued loading even when gathering arms are momentarily stalled with hard digging.

8-SC SHUTTLE CAR

Four-wheel positive drive, four-wheel hydraulic steering—with a new, wider, tapered-end design that permits minimum turning clearance. Only 26" high, yet with level capacity of 2 tons. Centrally located operator's station gives equal visibility in either direction. Separate motors for traction, conveyor drive, and hydraulic pump drive. Exclusive JOY disc-type brakes on all four wheels—hydraulic cable reel and hydraulically-adjustable elevating discharge.

A HIGH CAPACITY Team for Very Low Vein Coal

We're proud to announce one of the greatest forward steps since the original JOY pioneering achievements in mechanical mining. *Now, for the first time*—with the advent of the JOY 12-RB Cutter, 20-BU-1 Loader and 8-SC Shuttle Car—high capacity production has become a reality for mines operating in very low coal. Here are some of the advantages. (1) The timing problems and labor of conveyor moves are eliminated in favor of the great flexibility and economy of shuttle-car mining. (2) The high mobility of JOY trackless equipment permits high-speed mining both on advance and retreat. (3) In case of a squeeze, only a few minutes are required to move all equipment from the section. ● *Call on us for any data you need.*

For thin or thick seams, whatever your operating conditions may be, JOY builds a complete, field-proved line of modern mining equipment to increase your tonnage and reduce your costs.

Consult a Joy Engineer

8-D CL 3410

JOY MANUFACTURING COMPANY

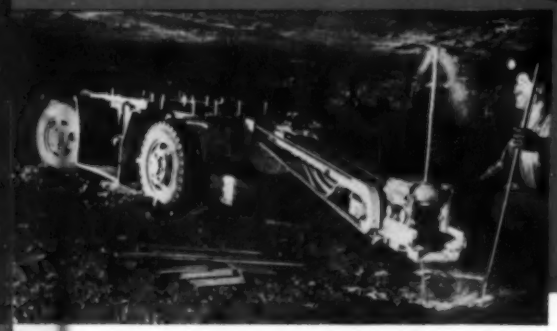
GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

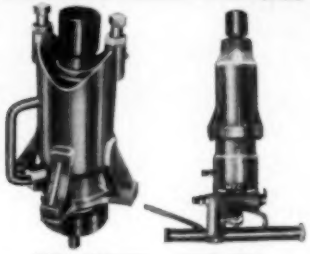
ONE-MAN OPERATED . . . SELF-PROPELLED

. . . AND WITHOUT AN EQUAL FOR FAST,

ECONOMICAL ROOF-BOLT DRILLING



HYDRAULIC IMPACT WRENCHES



DRILL-MOUNTED HAND-HELD

the JOY RBD-1 HYDRAULIC ROOF-BOLTING DRILL

★ Built in 26″, 30″ and 36″ heights. Wherever rotary drills are applicable, the RBD-1 consistently out-drills other types—either pneumatic or electric—producing as many as *two-thirds more holes* per shift.

★ Bottoms your roof-bolting holes with only one steel change in practically all cases. Except in the thickest seams, *no other drill* will do this.

★ Rubber-tired and self-propelled—equipped with hydraulic controls for *one-man* operation. Employs boom feed, and is self-leveling and self-aligning while drilling.

★ May be equipped for wet drilling—or with vacuum dust remover, as desired—to eliminate objectionable dust.

★ Hydraulic impact wrenches are available, either drill-mounted, feed-leg mounted, or hand-held types. All types derive their power from the machine—have ample torque to drive nuts to refusal.

★ SULMET Carbide Bits and Drill Steels designed for the RBD-1 Drill are available.

Consult a Joy Engineer

W & D CL 3412

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

Big and Strong... Better than Ever...

MARION 111-M

Machine illustrated has Diesel power with electric swing. Also available as full Ward-Leonard Electric machine.

MARION gave the industry a new conception of excavating equipment in 1946 when the MARION 111-M was introduced. Here was a 3½-4 cu. yd. machine with all of the benefits of Diesel power PLUS all of the advantages of electric swing. Big enough for high daily yardage, yet easily moved from one job to another. Power enough to stand up to big jobs without flinching. Heavy enough to be steady on its long, wide crawlers.

Now—the MARION 111-M is bigger and stronger—better than ever. It is a thoroughly field-proven machine, piling up performance records that are truly impressive. (Write for copies of letters from 111-M owners.)

Regardless of whether you have seen the MARION 111-M before, you should see it today if a 3½-4 cu. yd. machine has a logical place in your operations. It's a rugged, heavy machine as a shovel or dragline with power and strength to spare.

The 111-M is an important new tool for heavy-duty material handling. Get the full story from your MARION representative or write to the factory for information.

MARION POWER SHOVEL COMPANY

MARION, OHIO, U.S.A.

Offices and Warehouses in all Principal Cities • Established 1884

Finest Buy in the Land . . . on *Every* Count!

NEW 1951 CHEVROLET

Advance-Design

TRUCKS

These new 1951 Chevrolet trucks are tops in value. They're tough and rugged. They're loaded to the brim with power. They're thrifty . . . move massive loads . . . handle like no other truck. Chevrolet's latest haulers have 51's finest new features, too. Features like new, super-effective brakes that are extra-safe and easy to operate. Features like Chevrolet's Dual-Shoe parking brake, Chevrolet's new Ventipanes and new cab seats that bring you comfort with a capital "C." Visit your Chevrolet dealer and look over these great new trucks. You'll find the right truck for *your* job!

CHEVROLET MOTOR DIVISION, *General Motors Corporation*
DETROIT 2, MICHIGAN

CHEVROLET

ADVANCE-DESIGN TRUCK FEATURES

TWO GREAT VALVE-IN-HEAD ENGINES—the 105-h.p. Loadmaster or the 92-h.p. Thriftmaster—to give you greater power per gallon, lower cost per load • POWER-JET CARBURETOR — for smooth, quick acceleration response • DIAPHRAGM SPRING CLUTCH—for easy-action engagement • SYNCHRO-MESH TRANSMISSIONS—for fast, smooth shifting • HYPOID REAR AXLES—for dependability and long life • NEW TORQUE-ACTION BRAKES—for light-duty models • PROVED DEPENDABLE DOUBLE-ARTICULATED BRAKES—for medium-duty models • NEW TWIN-ACTION REAR BRAKES—for heavy-duty models • NEW DUAL-SHOE PARKING BRAKE—for greater holding ability on heavy-duty models • NEW CAB SEATS—for complete riding comfort • NEW VENTIPANES—for improved cab ventilation • WIDE-BASE WHEELS—for increased tire mileage • BALL-TYPE STEERING—for easier handling • UNIT-DESIGN BODIES—for greater load protection • ADVANCE-DESIGN STYLING—for increased comfort and modern appearance.

PARIS MANUFACTURING COMPANY

Announces

THREE *NEW* DRILLS

The PARMANCO Coal Drill will drill 2½ inch holes at a speed of up to six feet per minute in #5 coal. Equipped with heavy duty truck-type transmission and rear end and a complete hydraulic feed, the drill is operated by one man from the control seat. It is made in two sizes with a 12 h.p. or 25 h.p. gas motor and all units are completely self-contained and enclosed in oil-tight cases.

ALREADY USED by

Big Seed Collieries, Inc.	1	Enos Coal Co.	1
United Electric Coal Co.	9	Southeastern Ill. Coal Co.	1
Fairview Collieries Corp.	2	Truax-Traer Coal Company	2
Colonial Coal Co.	1	Refractory Field	
Little Sister Coal Co.	1	Harbison-Walker Refractories Co.	1
Hume-Sinclair Coal Mining Co.	4	Mexico Refractories Co.	1
Sherwood-Templeton Coal Co.	1	A. P. Green Fire Brick Co.	1

THIS UNIT IS DELIVERING 6-INCH SHOT HOLES — READY FOR LOADING at Better Than Two Feet a Minute ! ! !

The new PARMANCO Hi-Speed Horizontal Drill is completely redesigned around a 40 h.p. engine with four drilling speeds which, in field tests, has cut one-third off the footage drilling time —a cost-per-drilling-foot saving that we are passing on to the strip mine operator and contractor at no increase in our price. In addition the drill is equipped with a starter and generator, dual type front wheels, truck type rear axle with mechanical brakes and a traction drive with both forward and reverse.

Rope leads from

UPSON-WALTON

Selecting the "lay" of wire rope

● An important characteristic of a wire rope is its *lay*—the relative directions in which wires in the strands, and strands in the rope are twisted.

In *regular lay* rope, the wires in the strands are twisted in the opposite direction to the strands in the rope.

However *lang lay* rope—in which wires and strands are twisted in the same direction—offers several advantages:

- it flexes better
- it has more resistance to abrasion
- it has more resistance to bending fatigue

When choosing *lang lay,* be sure to specify that it be "preformed". An extra operation in the manufacture of Upson-Walton's LAYRITE preformed rope forms the wires and strands in a fixed spiral. This frees each part from internal stress. Years of rugged service have shown that Upson-Walton's LAYRITE wears longer, cuts maintenance costs.

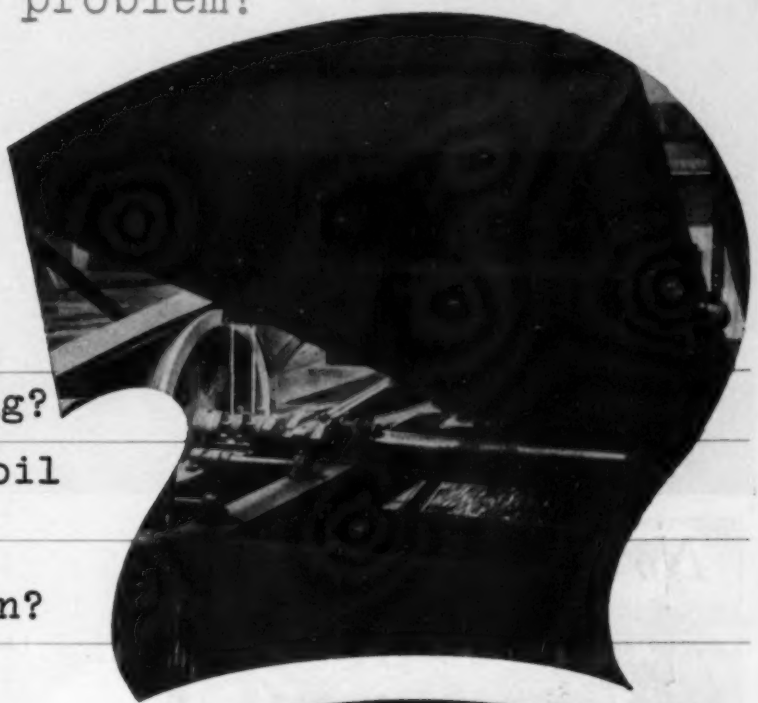
Specify it on your next tough job.

THE UPSON-WALTON CO.
CLEVELAND, OHIO
NEW YORK • CHICAGO • PITTSBURGH

wire rope • rope fittings
brattice cloth • tackle blocks

MATCH YOUR WIRE ROPE TO YOUR FITTINGS AND BLOCKS... ONLY UPSON WALTON OFFERS ALL THREE

Have an eccentric strap lubrication problem?



excessive wear?

overheating?

excessive oil leakage?

grease separation?

lubricant washout?

The answer— **Gulf Cam Grease**

You'll find in Gulf Cam Grease all the properties necessary to provide sure protection for shaker screen eccentric straps under most operating conditions. You'll make fewer bearing replacements, avoid lubrication problems, and reduce maintenance costs.

Gulf Cam Grease has a high dropping point and doesn't leak out of eccentric strap bearings even at high operating temperatures. Thus you prevent excessive lubricant consumption, starved bearings—and eliminate a safety hazard.

Because of its exceptional stability at high temperatures, it does not separate nor oxidize appreciably in the most severe service—additional assurance of continuous protection. Unlike most high-temperature lubricants, Gulf Cam Grease is effective where wet conditions prevail—is not readily washed out of the bearings.

Gulf Cam Grease is recommended for the lubrication of plain sleeve bearings in the eccentric straps of shaker screens in breakers and preparation plants.

For further information on Gulf Cam Grease and for expert help on other phases of lubrication in your mine, call in a Gulf Lubrication Engineer today. Write, wire, or phone your nearest Gulf office. Gulf Oil Corporation · Gulf Refining Company, Gulf Building, Pittsburgh 30, Pennsylvania.

FIFTY YEARS OF SERVICE
1901 GULF 1951
PETROLEUM AND ITS PRODUCTS

ROCKMASTER *blast by Fauzio Brothers at Lehigh Navigation Coal Company's Nesquehoning, Pa., stripping operation.*

No rock pile this . . . but the high point of a blast!

THE machine-gun camera reels off twelve photos—one every 1/8 second—to "freeze" at its peak this typical ROCKMASTER "16" blast—three seconds after initiation of the shot. Here you see no wasted explosives gas, no wild rock—proof that ROCKMASTER "16" blasting can mean true *controlled force . . . controlled throw . . . controlled breakage!*

ROCKMASTER "16" may be the answer to *your* problems whether your job calls for blasting coal, rock, ore. The free ROCKMASTER "16" booklet shows how you can profit through the use of the correct numbers of the *sixteen* ROCKMASTER milli-second delay electric blasting caps teamed with the ROCKMASTER system of explosives choice and loading methods. Write for your copy. Our technicians will be glad to assist you in applying ROCKMASTER "16" to your operations.

VISIT US

and See the advantages of the

Rockmaster System

Proved by Machine-Gun Camera Photos

at BOOTH 1400

American Mining Congress Coal Show

Public Auditorium

Cleveland, Ohio

May 14-17

Rockmaster: Reg. U.S. Pat. Off.

ATLAS EXPLOSIVES

"Everything for Blasting"

CHEMICALS ATLAS EXPLOSIVES

ATLAS POWDER COMPANY, Wilmington, Del. • *Offices in principal cities* • *Cable Address—Atpowco*

TAKES HEAVY IMPACT

LIKE A POOL TAKES A PEBBLE

Homocord CONVEYOR BELT

"We seldom see a cut or gouge in Homocord Conveyor Belts. And they consistently outlast other belts on heavy-duty installations."

There are engineering reasons for this typical user report. The extra body-cushion built into Homocord dissipates the shock of sharp impact from large lumps of coal, ore and rock . . . assures long life. Natural troughing and flexibility add up to more ton-miles of materials carried.

Full description of these and other advantages are described in Bulletin 6906. Let us send you a copy. You get the same long-life engineering in R/M hose, V-belts and flat belting. Ask your R/M representative.

MANHATTAN RUBBER DIVISION — PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC.

Manufacturers of Mechanical Rubber Products • Rubber Covered Equipment • Radiator Hose • Fan Belts • Brake Linings • Brake Blocks • Clutch Facings • Packings • Asbestos Textiles • Powdered Metal Products • Abrasive and Diamond Wheels • Bowling Balls

These GIANT-SIZED may fit some of your

On job illustrated, 10 units deliver 667 pay yds. hourly on 1½-mi. cycles

With approximately 3½ million yards of sand, gravel, clay and shale to move at Pierre, South Dakota, Campbell & Collins assigned 80% of total dirtmoving to 10 giant-sized, rubber-tired A Tournapulls. Here's a report on how their 240 h.p. rigs, 7 of them with 25-ton (22-yd.) Carryalls and 3 with 35-ton (30-yd.) Carryalls, are speeding long-haul dirtmoving on Oahe dam:

When these pictures were taken, the fleet was hauling tough, sun-baked sandy clay from 2 pits, one with loading on the level and the other with loading down 35% grades. In the level pit, two 144 h.p. pushers teamed up to help Tournapulls get heaped loads in 70 to 115 seconds (average, 93 seconds) with a load distance of 175 to 250 ft. In the downhill pit, using one 144 h.p. pusher, Tournapulls cut load time to 23 to 55 seconds (average, 38 seconds), and load distance to about 75 ft. From both pits, the 25-ton E-25 Carryalls were getting average loads of 16 pay yards . . . the larger 35-ton E-35's, 21 pay yards.

Haul cycles from both pits averaged 1½ miles . . . with 4700 ft. of favorable 9% grade to dump and 4225 ft. of adverse 1 to 14% grades on return. Giant 4-wheel air brakes — with 1812 sq. in. of braking surface on each wheel — permitted safe use of haul speeds up to 34 m.p.h. Dumping on the run helped each electric-control Tournapull complete a 7,925-ft. round trip every 13.1 minutes. On the basis of 50-minute efficiency, that's 3.8 trips per hour per unit, and an hourly output for each of the 7 E-25 scraper-equipped rigs of 61 cubic yards . . . and for each of the 3 E-35's of 80 cubic yards.

Drive 190 miles to Pierre

Six of these Tournapulls are veterans of another big earthmoving job near Lemmon, South Dakota. Their efficiency record on this job for the entire 1949 season was 85%. When finished there, the 6 rigs drove under their own power to Pierre . . . made the 190-mile trip through traffic over main highways.

For your stripping, it will pay you to investigate the big pay loads and new low dirtmoving costs possible with these mobile, 35-ton (30-yd.) and 25-ton (22-yd.) A Tournapulls. Call your LeTourneau Distributor for complete job-proved facts and figures, or write TODAY.

Tournapulls spread their loads in level layers. Topsoil can easily be separated and used to turn mined area into saleable farm acreage.

LeTOURNEAU LeT EQUIPMENT

Mail today to: R. G. LeTOURNEAU, Inc., Peoria, Illinois

☐ Please furnish more information about your BIG Tournapulls.

Name _____ Title _____

Company _____

Street _____ City, State _____

Type of work to be handled _____

Also interested in:

☐ 35 m.p.h., 13.5-yd. C Tournapull

☐ 28 m.p.h., 7-yd. D Tournapull

☐ 19 m.p.h. C Tournadozer

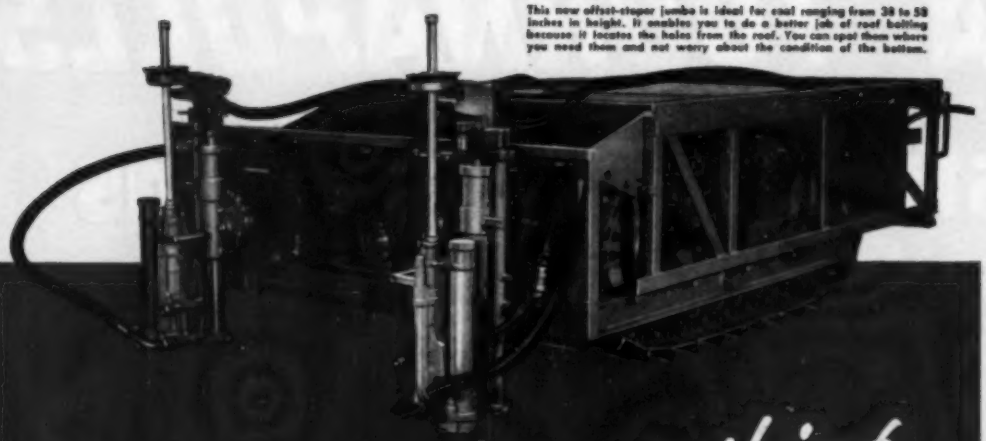
"A" TOURNAPULLS
stripping problems

On stripping work, the big-capacity A Tournapull is the equivalent of a 30-yd. dragline bucket on rubber tires, self-powered, fast, with unlimited range . . . can handle complete removal of overburden, bench stripping, opening of box cuts, etc. Once loaded, each unit operates independently, hauling and unloading anywhere under its own power.

Tournadozer-Tournapull-Carryall-Trademark Reg. U.S. Pat. Off. C141 cm

LE TOURNEAU PEORIA ILLINOIS — JOB-PROVED Over 3400 Built and Ordered — **TOURNAPULLS**

FOR LOWEST NET COST PER YARD



This new offset-stoper jumbo is ideal for coal ranging from 38 to 58 inches in height. It enables you to do a better job of roof bolting because it locates the holes from the roof. You can spot them where you need them and not worry about the condition of the bottom.

Here's the latest thing in Roof Bolting

A New Offset-Stoper Jumbo by Le Roi-CLEVELAND

Check these features and you see why this revolutionary jumbo makes roof-bolting faster, easier, more thorough.

NOW you can do your roof-bolting jobs faster and better than ever. The new Le Roi-CLEVELAND offset-stoper jumbo does all the hard work — carries the stopers, the drill steel, in fact all the material needed for a full shift of roof bolting. Your miners are less tired — get more done. Here's why:

Mobility

The jumbo is mounted on an electrically driven (permissible) crawler tractor. It gives you three forward speeds up to 3 mph and one reverse speed (1 mph). Mercury clutch for smooth operation. Brakes for turning. Side driver seat with full controls for travel in either direction.

Faster drilling and bolting

Jumbo carries 2 Le Roi-CLEVELAND S-11S offset-stopers, each with 12-inch steel change. The feed-legs of these stopers do two jobs — raise the machines to drilling position and position the dust collectors at the drilling face. All controls are conveniently located so that you can drill holes, drive bolts, and set nuts with one set-up.

Positive dust control

On this new unit, there's a separate dust collector for each stoper drill. The fines are deposited as follows: 95% in a primary tank and 5% in a filtered secondary tank having a filter area of 60 sq. ft. for each stoper.

Add all these things up and you have the latest thing in roof bolting. Try this new unit in your property. Watch your costs drop, production rise. Write for complete details.

LE ROI COMPANY

RD-38

CLEVELAND ROCK DRILL DIVISION
12500 Berea Road, Cleveland 11, Ohio
Plants: Milwaukee, Cleveland and Greenwich, Ohio

"Looks as if it'll never wear out!"

Well . . . that's saying quite a lot, young man, even if it *is* a Bethlehem rope. True, you're justified in predicting a long and useful life for the rope; but even we, who made it, don't expect it to last forever.

We *do* expect that you and your boss will be pleased with the service it gives you; pleased with the way it stands up and the way it keeps going after other ropes have been retired. You see, we know the craftsmanship that goes into the making of Bethlehem wire rope; the craftsmanship and the fine materials from crown wires to core. We feel, as you do, that it's a good product . . . fully as good as it looks and then some.

There'll come a day, of course, when you'll have to replace that Bethlehem rope you're looking at. But it won't be soon. So, rig it up and put it to work and say to yourself, "There's one we won't have to bother about for a long time."

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

When you think WIRE ROPE... think BETHLEHEM

GET MAXIMUM

GET GREATER MINING ECONOMY WITH THESE PROVEN CARBOLOY TOOLS

Carboloy's Improved

AUGER DRILL BIT

—for faster, easier drilling

Ideal for post, mounted, and push drills!

Check these quality features:

- ★ Maximum clearance and relief angles permit freer, faster cutting.
- ★ Improved spiral prevents packing of coal cuttings.
- ★ Uniform high-quality carbide throughout entire tip. Assures longer bit life.
- ★ Long tips of Carboloy cemented carbide permit many more regrinds.

PLUS

- ★ Forged alloy steel shank.

Carboloy's Improved

FINGER BIT

—for strip, underground mining

Perfect for use in hard-to-take-hold-of medium ground!

Real gouging action; fits all standard auger drill heads using ½" bits. Other plus features:

- ★ Faster cutting due to larger clearance angle on shank.
- ★ Drills more freely.
- ★ Less pressure required.
- ★ Uniform high quality throughout entire tip.

PLUS

- ★ Alloy steel shank, heat-treated.

Carboloy's

MINING MACHINE BIT

—with 8 important advantages:

- ★ Shank level with insert for free flow of coal.
- ★ Less shank steel to grind, yet adequate insert support.
- ★ Less carbide to grind; faster grinding, greater tip economy.
- ★ Smaller point for less power consumption.
- ★ No shoulders; set to any gauge size within range of uses.
- ★ Maximum hold through combination of braze and mechanical holding.
- ★ Approximately 50% greater thickness of insert at cutting edge.

PLUS

- ★ Alloy steel shank, heat-treated to maximum physical strength; permits set screw clamping.

Visit Carboloy Company, Booth 825, at the Coal Convention in Cleveland, May 14 to 17.

Improved Carboloy

ROOF BOLTING DRILL

For faster, easier drilling in hard slate, shale, and laminated limestone.

Tipped with Carboloy Cemented carbide—the hardest metal made by man—to give maximum speed in roof drilling. Develops rotary faster drilling speed than pneumatic methods. Improved flute design to remove cuttings faster; alloy steel body for greater strength.

EFFICIENCY...

with uniform high quality CARBOLOY® CEMENTED CARBIDE coal mining tools

CARBOLOY tools assure you of maximum efficiency, lower cost per ton because Carboloy Company—*and only Carboloy*—backs every tool with 29 rigid quality tests.

You also get these three exclusive features that spell quality in every Carboloy tool:

1 ***Carboloy's program of continuous grade improvement***—rather than changing grades for special purposes.

2 ***Carboloy's program of engineering and research***—the nation's largest and most complete facilities devoted to carbides.

3 ***Carboloy's unexcelled production facilities***—the finest in the world for mass production of cemented carbide tools.

Carboloy Company also offers complete services to help you get longest life, greatest efficiency from your carbide tools.

Aids for conserving your cemented tungsten carbide tools

Carboloy's up-to-date Maintenance Instruction Manual, expert Field Engineers, and your local Distributor can help you set up a practical plan, using the most efficient equipment and sharpening practices, to help you get the most from carbide coal mining tools.

For uniform, high quality Carboloy Coal Mining Tools and further information about Carboloy's tool conservation services, see your nearest Authorized Carboloy Distributor now. Or, write Carboloy Company, Inc., direct.

CARBOLOY COMPANY, INC.

A General Electric Affiliate

11120 E. 8 Mile Street, Detroit 32, Michigan

® The registered trade-mark "Carboloy" denotes manufacture by Carboloy Company, Inc.

For Maximum Mining Efficiency

Specify CARBOLOY

THE QUALITY BRAND OF COAL MINING TOOLS

Tops in sales because they keep costs down!

Month after month, year after year, International Trucks cut hauling costs and give you better on-the-job performance.

Where's the proof?—in the carefully-kept cost records of heavy-duty haulers; the same men who have kept Internationals first in heavy-duty truck sales for 19 years. Their records are black-and-white proof that Internationals give you lower operating and maintenance costs even on the toughest jobs.

Where's the pay-off for you?—every new International Truck is *heavy-duty engineered* with extra stamina in every part to give you this same cost-cutting performance with longer truck life on *your* job.

You get the right truck for your job

When you buy a new International Truck you don't gamble with a "misfit" truck. You get the engine, the transmission, the axle, *everything* specialized to fit your particular job. You get a truck that's built to last and give you more efficient on-the-job performance. That's why over half the Internationals built in the last 45 years are still in operation.

You get a truck that drivers go for

The better a driver likes his truck, the better care he takes of it. That's why every new International is specialized from the driver's standpoint, too. An all-new steering system gives the driver more positive control from a more comfortable position. New Super-maneuverability lets him turn in the shortest *practical* circles—helps him in the tight spots.

The new Comfo-Vision Cab is the "roomiest cab on the road." It has mighty comfortable, fully-adjustable seats. And the driver enjoys full-front visibility through the one-piece Sweepsight windshield.

With 87 basic models, thousands of specialized variations, in the world's most complete line of trucks, you're sure of getting the right truck for your job. See the new International Trucks at your nearest International Truck Dealer or Branch *now*.

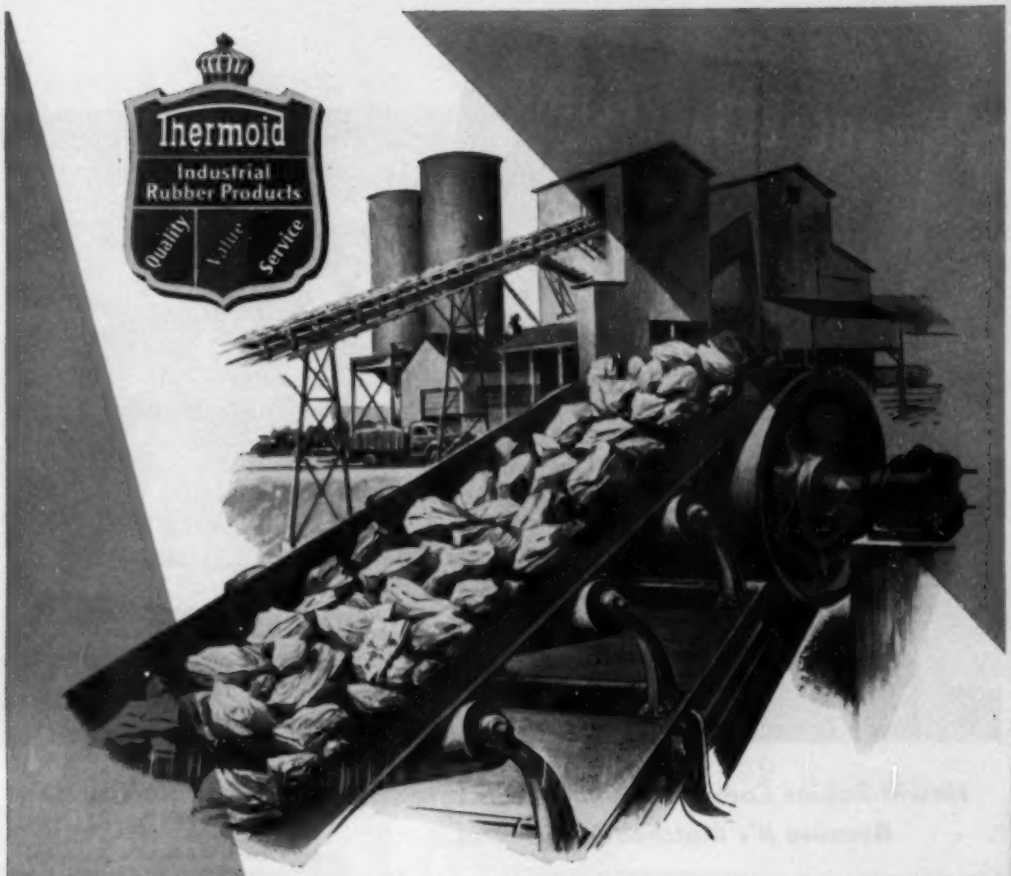
International Harvester Builds McCormick Farm Equipment and Farmall Tractors . . . Motor Trucks . . . Industrial Power . . . Refrigerators and Freezers

International Harvester Company • Chicago

See the new

INTERNATIONAL TRUCKS

Every model heavy-duty engineered for the long haul



"Whatever Your Conveyor Belting Problem . . . *Thermoid Has The Answer*"

Whatever the job—whatever the nature of the materials to be handled—heavy or light, soft or abrasive, hot or cold, wet or dry, uniform or non-uniform in size—there is a Thermoid belt built to do the job at the lowest cost per ton of material handled.

Thermoid belts are made with an extra margin of endurance. You will find they stay on the job long after ordinary belts fail. With Thermoid, you will have fewer delays due to belt breakage or premature wear. Your Thermoid distributor will be glad to help you with your requirements.

Here's The Book That Will Answer Many Of Your Questions

Drop us a line for your free copy of Book No. 3679. It is a handy reference guide, concise and complete. 16 pages of valuable charts, tables and graphs tell how to select the right conveyor or elevator belt for the materials to be handled . . . how to determine capacities, speeds, weights and number of plies.

Conveyor & Elevator Belting • Transmission Belting
F.H.P. & Multiple V-Belts • Wrapped & Molded Hose

Thermoid

Rubber Sheet Packings • Molded Products
Industrial Brake Linings and Friction Materials

Thermoid Company • Offices & Factories: Trenton, N. J. Nephi, Utah

Hewitt-Robins Conveyor Belting Lasts Longer Because It's Matched to the Load

Over the years, belt conveyor operators have found it's false economy to "cut corners" on their belting. The best belting they can buy has always proved *the best buy* . . . in extra months or years of service, freedom from repairs and ease of maintenance.

And what's "best" for one materials handling job isn't always best for another. That's why we make three types of belting: Maltese Cross® for the hardest, toughest jobs; Ajax® for general service, and Conservo® for lighter applications and portable conveyors.

Each is matched to the load it will carry. Ajax Underground Belting, for example, is designed for heavy-duty, around-the-clock underground coal mine service. Because it's built to take the hardest kind of punishment, it means bigger tonnage hauls at less cost.

There's a Hewitt-Robins conveyor belt for every bulk materials handling assignment, below and above ground. For the best buys in belting, call your Hewitt Rubber distributor (listed under "Rubber Products" in the classified phone book), or write Hewitt Rubber Division, 240 Kensington Avenue, Buffalo 5, N. Y.

EVERYTHING YOU WANT IN CONVEYOR BELTING!

- **Hewitt-Robins belting is especially treated to resist the destructive action of moisture and mildew. High-grade frictions and liberal skim coat insure against ply-separation.**
- **Abrasion-resistant covers are made of extra tough rubber. Rigid-edge construction prevents curling . . . insures true troughing.**
- **Heavy textile reinforcement provides great strength with high flexibility.**
- **Dollar for dollar, you can't buy *longer belt life* anywhere!**

HEWITT-ROBINS
CONVEYOR BELTING

HEWITT-ROBINS HR INCORPORATED

BELT CONVEYORS (*belting and machinery*) • BELT AND BUCKET ELEVATORS • CAR SHAKEOUTS • DEWATERIZERS • FEEDERS • FOAM RUBBER PRODUCTS • FOUNDRY SHAKEOUTS • INDUSTRIAL HOSE • MINE CONVEYORS • MOLDED RUBBER GOODS • RUBBERLOKT ROTARY WIRE BRUSHES • SCREEN CLOTH • SKIP HOISTS • STACKERS • TRANSMISSION BELTING • VIBRATING CONVEYORS, FEEDERS AND SCREENS

Speed Trucks in "Stop and Go" Traffic

The steady increase in traffic volume is of growing concern to truck operators. Unless trucks can keep pace with the flow of cars, schedules are slowed down and operating costs rise expensively.

Eaton 2-Speed Axles help truck owners solve this problem. Their vehicles have twice the conventional number of gear ratios. That means they can use a "low" gear for quick pick-up under full load. It means easier maneuvering in tight spots. It means climbing most hills faster. It means highballing on the open road. These advantages also result in operating economies—fewer stops for gas and oil—less time in the shop, because engines and all power transmitting parts last longer.

Your dealer will be happy to explain the value of Eaton 2-Speed Axles and tell you how Eaton's exclusive planetary gearing and positive lubrication assure long axle life.

EATON
2-Speed Truck
AXLES

Axle Division

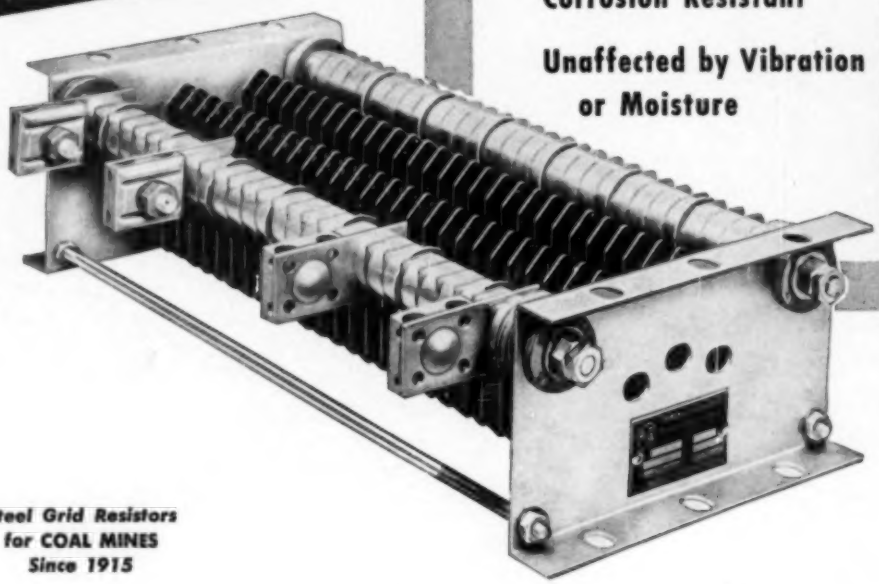
EATON MANUFACTURING COMPANY

CLEVELAND, OHIO

PRODUCTS: SODIUM COOLED, POPPET, AND FREE VALVES • TAPPETS • HYDRAULIC VALVE LIFTERS • VALVE SEAT INSERTS • JET ENGINE PARTS • ROTOR PUMPS • MOTOR TRUCK AXLES • PERMANENT MOLD GRAY IRON CASTINGS • HEATER-DEFROSTER UNITS • SNAP RINGS SPRINGTITES • SPRING WASHERS • COLD DRAWN STEEL • STAMPINGS • LEAF AND COIL SPRINGS • DYNAMATIC DRIVES, BRAKES, DYNAMOMETERS

RUGGED
ALL THE WAY *Thru*

- All Steel Construction
- Mica Insulation
- Rugged Terminals
- Provision for Expansion
- Adequate Ventilation
- Corrosion Resistant
- Unaffected by Vibration or Moisture



Steel Grid Resistors for COAL MINES Since 1915

P-G Resistors, assembled from alloy steel resistance grids with mica insulation, are naturally resistant to many of the operating conditions usually associated with resistor trouble. Try P-G Resistors next time on your toughest job, they are rugged . . . they are dependable.

P-G

The Nonbreakable Steel Grid Resistor

THE POST-GLOVER ELECTRIC COMPANY

•ESTABLISHED 1892•

221 WEST THIRD STREET, CINCINNATI 2, OHIO

"Washington calling!"

We were expecting this call. In a sense it is the people of America on the other end of the telephone. For some time they have been calling upon our government to take whatever steps are necessary to equip our fighting men for any job they may have to do.

Korea has proved the fallacy of limited preparedness. You know now that the nation is girding for survival. The people of America have said—and rightly—that private industry should provide the Armed Forces with whatever is necessary.

Machines are being mobilized. "Caterpillar" products are wearing olive drab once more. Because of large military demands your present machines may have to work longer than you had anticipated.

You can get many extra hours of machine service life if you:

1. **Follow a sound program of operation and maintenance.**
2. **Consult your Operator's Instruction Book, using it as a constant guide in caring for your machines.**
3. **Secure the assistance of your "Caterpillar" dealer who now, more than ever before, is your working partner for the grim job that may lie ahead.**

• • •

CATERPILLAR TRACTOR CO., PEORIA, ILLINOIS

CATERPILLAR

REG. U. S. PAT. OFF.

Diesel Engines • Tractors • Motor Graders • Earthmoving Equipment

Every Air Hose With This Trademark

Assures Long Operating Life

Air hose economy is not measured in feet per dollar. The only true yardstick of air hose value is *service hours.*

Because every BWH hose has been developed, tested and field-proven to give the best possible combination of strength, safety, flexibility and damage resistance . . . *you get maximum service life.*

Whatever brand of hose you are now buying, you are paying for BWH benefits — so why not start getting them — *now?*

Today, contact your nearby BWH Distributor.

CONCORD AIR

An extra quality, exceptionally rugged hose for toughest use on air drill and pneumatic service in mines, quarries and construction jobs. Non-porous tube resists heat and oil. High tensile cotton yarn braid reinforce carcass. Tough grey cover resists cutting, gouging, abrasion. 7 sizes from ¼" 2-braid through 2" 3-braid. 200 to 300 lbs. working pressure. Maximum length 50'.

BAY STATE AIR DRILL

For heavy construction work in mines, quarries, tunnels and wherever large size hose is required for long service. Smooth black tube resists heat and oil. Carcass of strong, rubber-impregnated multiple ply woven duck. Rugged, heavy-gauge red rubber cover resists severe weather extremes, cutting, abrasion. 9 sizes stocked from ½" to 4". Working pressures from 175 to 225 lbs. Maximum length 50'.

AUROCHS AIR

For portable air compressors, jackhammers, rugged industrial and construction work. Smooth, black, non-porous tube resists heat and oil. Carcass multiple ply, rubber-impregnated, rugged woven fabric. Tough black cover resists weather and abrasion. Stocked sizes ½", ¾", 1", 200 lbs. working pressure. Maximum length 50'.

TIGER AIR

Lightweight, flexible hose for general industrial and medium air service. Smooth black tube resists oil and heat. Carcass is strong, lightweight multiple ply woven fabric. Tough, black cover resists abrasion. Stocked sizes ¼", ⅜", ½". 150 lbs. working pressure. Maximum length 50'.

VIM AIR

For general industrial use, on compressors and pneumatic tools. Black tube resists oil and heat. Husky cotton yarn braids. Smooth, red cover resists weather, abrasion. 8 sizes stocked, ¼" 2-braid to 1" 3-braid. Working pressures 150 to 225 lbs. Maximum length 500'.

BULL DOG VARI-PURPOSE AIR

For a variety of jobs including handling of air, water, oil, gasoline, kerosene (not for paints, lacquers, lacquer-solvents). Black, synthetic tube resists oil and heat. Carcass is braided rayon cord, high strength, super flexible. Smooth, brown, tough synthetic cover resists oil, abrasion, sunlight. 11 sizes stocked from 3/16" one-braid to 1" 3-braid. Working pressures 200 to 300 lbs. Maximum length approximately 500'.

BWH
DEPENDABLE RUGGEDNESS

BOSTON WOVEN HOSE & RUBBER COMPANY

Distributors in all Principal Cities

PLANT: CAMBRIDGE, MASS. • P. O. BOX 1071, BOSTON 3, MASS., U. S. A.

ALL ROPES *look* ALIKE... but

What has grain size of steel to do with longer rope life?

Plenty!

That's because in every commercial grade of wire rope, there's a certain critical grain size that gives highest resistance to bending fatigue. In Wickwire Rope we make sure that you get this definite grain size and that it is always uniform to exacting McQuaid-Ehn* standards.

Only a fully integrated company like Wickwire can give you this big advantage...because such control of grain size is possible only where all phases of manufacture are under constant check and test...starting with the melting and refining of the steel and continuing through heat-treating processes and cold drawing of the wire.

Here again—Wickwire goes "beyond specifications" to give you assurance of wire rope that can't be beat for reliability, safety and longer life.

*For detailed information on the McQuaid-Ehn test, write to our Sales Office, at Palmer, Mass.

LOOK FOR THE YELLOW TRIANGLE ON THE REEL

Automatic heat control in our patenting or heat treating furnace operates within such close limits that the temperature in the furnace never varies more than a small fraction of one per cent.

WICKWIRE ROPE

CF&I

A PRODUCT OF THE WICKWIRE SPENCER STEEL DIVISION OF THE COLORADO FUEL AND IRON CORPORATION

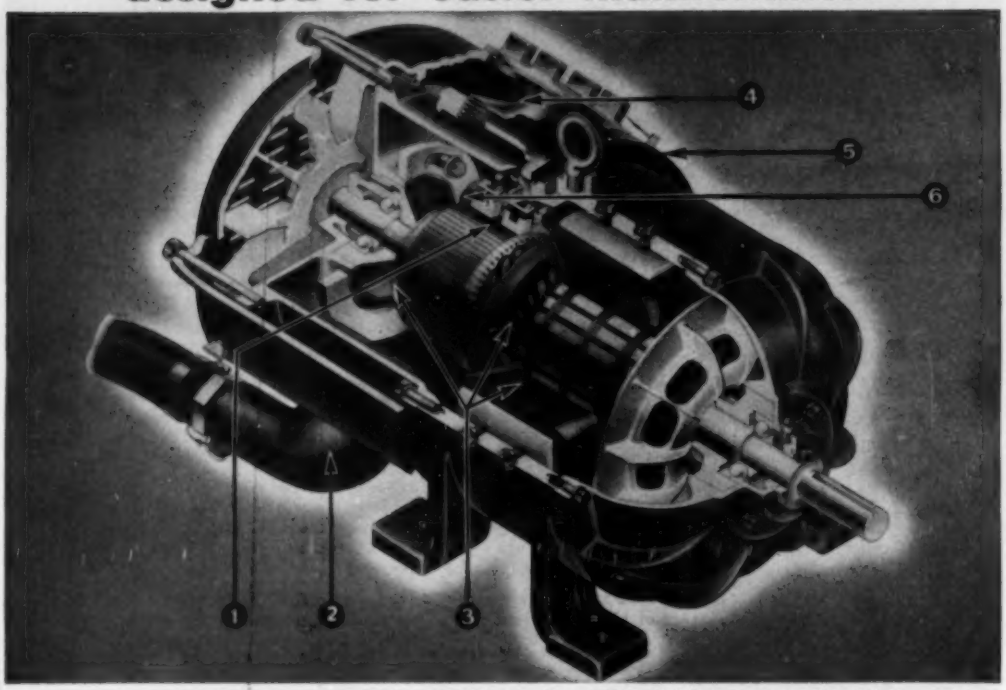
WIRE ROPE SALES OFFICE AND PLANT—Palmer, Mass. EXECUTIVE OFFICE—500 Fifth Avenue, New York 18, N. Y.

SALES OFFICES—Abilene (Tex.) • Boston • Buffalo • Casper • Chattanooga • Chicago • Denver • Detroit • Emlenton (Pa.) • Houston • New York Odessa (Tex.) • Philadelphia • Phoenix • Salt Lake City • Tulsa

PACIFIC COAST SUBSIDIARY—The California Wire Cloth Corporation, Oakland 6, California

ANNOUNCING

completely New G-E MINE MOTOR —designed for easier maintenance!



Completely NEW!

DC mine Motors

Explosion-proof, listed by U.S. Bureau of Mines, for any underground mining use

Here's the completely new General Electric d-c mine motor—with all the convenience features operators and mining-machinery manufacturers told us were wanted most! And here are just six out of 21 reasons why it's so *much* easier to inspect and maintain, longer-lasting, easier to install:

1. **New two-stud brush construction** permits locating all brushes on only one half of commutator, eliminating need for access from four sides. Brushes are located on upper half unless otherwise requested. Brushes are easily accessible through two large hand holes located directly above brushes.

2. **Removable cable gland,** plus generous-length internal leads with convenient terminals, make it easy to replace cable right in the mine, without dismantling motor. Gland does not project beyond diameter of the motor.

3. **Moisture-resisting insulation** minimizes effects of moisture absorption which frequently causes mine-motor insulation failures.

4. **Special hand-hole cover design** lets ventilating air wipe entire surface of frame and end shield, assures adequate cooling. Screw-in-type cast bronze cover with sturdy lugs needs no special tools for removal.

5. **Sturdy fan housing,** of shock resistant cast-iron, is easily removed to clean air chamber. Machined fits assure its accurate alignment and rigid mounting.

6. **Brush-holder stud insulation** is made of mycalex, a glass-bonded, inorganic, non-tracking mica. Steel brush holder yoke will not chip or crack.

New booklet tells whole story! *All* the many advantages of this new, easier-to-maintain G-E mine motor—in ratings from ½ to 60 hp—are described in Bulletin GEA-5553, just off the press. Ask your G-E representative for *your* copy *today*, or write Dept. 663-15, *General Electric Company, Schenectady 5, N. Y.*

GENERAL ELECTRIC

663-25

JOY PUSH-PULL STYLE

ELECTRICAL CONNECTORS

Your confidence in JOY Electrical Plugs or Receptacles is always justified. Job-proven on thousands of installations under every conceivable working condition during the past quarter-century, they're unequalled for performance, safety and durability. One-piece-molded-to-cable design (details at left) makes them water-tight, shatter-proof and amazingly age resistant . . . and because they're made of Neoprene, oils, acids, alkalies or moisture have little effect on their life span or conducting efficiency.

Available in a wide variety of conductor numbers and sizes, they are ideal for connecting electrical power to all kinds of portable machinery or semi-stationary equipment subject to periodic relocation.

Remember—JOY job-proven Plugs and Receptacles actually cost less because they last longer. *Ask for full details with descriptive literature today.*

1. One-piece, factory molded assembly strengthens cable connector junction
2. Tough, *molded-as-a-unit* Neoprene Jacket resists wear and increases safety
3. Expert Pin and Socket design (see below) insures low-contact resistance
4. Neoprene faces fit closely when engaged, insuring a water-sealed connection

CHOICE OF 4 JOB-PROVEN STYLES

PUSH-LOCK . . . Slight twist during engagement locks connectors and prevents accidental disconnects. Available in 32 volt rating for welding needs. Also supplied in 600 and 5000 volt designs.

STANDARD ROUND . . . A favorite of many years standing. Single Conductor designs available for 600 or 5000 volts . . . multiple conductor designs rated at 600 volts.

STANDARD OVAL . . . Best for general all-around use. Available in polarized three and four or non-polarized three conductor designs rated for operation at 600 volts or less.

SHROUDED OVAL . . . Extended skirt or shroud on male plug guards contact pins. Available in polarized three and four conductor designs rated for operation at 600 volts or less.

WIDE SELECTION OF MATING RECEPTACLES

There's a JOY Receptacle or Gang (multiple outlet box) for nearly every standard electrical need. All have one-piece *replaceable* Neoprene inserts manufactured to the same exacting specifications set up for JOY Portable Plugs (see description above and at left). Many are available in choice of terminal back or pig-tail lead designs. UNIT ILLUSTRATED is Joy's No. 352MM, curved base three conductor Machine Receptacle.

SPRING LOADED FEMALE SOCKETS

Provide a long life of snug low-resistant contact. Spring-loading causes I.D. of socket to match O.D. of its mating male pin during engagement. Unique design prevents bell-mouthing or over-expansion.

SOLID MALE CONTACT PINS

JOY Male Connector Pins have no split ends to collect dust or increase resistance. They are accurately machined as solid units from high quality rod, carefully selected for its low resistance and wearing qualities.

CABLE VULCANIZERS . . .

JOY Vulcanizers for repairing and re-jacketing cable splices, quickly pay for themselves. Two designs are available, "steam" and "direct heat". Both are electrically heated and have automatic temperature controls. Bulletin AV106 describes them in detail and lists mold vs. cable sizes. *Ask for your free copy, now!*

Consult a Joy Engineer

W & D ME3488

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

"1951"
Sanford-Day's
50th
Anniversary

50 Years of Progress For Mining — Building Mine Cars Exclusively

The 1951 Coal Show will mark the half century point for Sanford-Day in serving the mining industry . . . 50 years of devoting its entire capacity to engineering and producing better mine cars to meet every requirement of coal mining.

Our display at the show will be of unusual interest to every coal mining man . . . a display you should not miss!

Today, with a completely modernized and completely retooled plant we are equipped to build more efficient mine cars than ever before. Backed by our staff of experienced engineers we look forward to the next half century secure in the knowledge that we can furnish the best mine cars the industry has ever used.

We cordially invite all members of the coal mining industry to visit us at Booth 1805, see our display, and join us in our 50th Anniversary Celebration!

Sanford-Day Iron Works
KNOXVILLE TENNESSEE

GENERALS go in—get the load—carry it out and over-the-highway

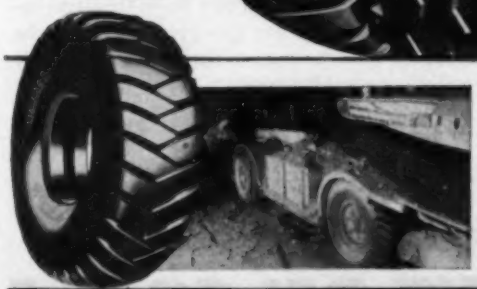
FASTER! EASIER! At Lower Cost!

Pile on the tons. The General L. C. M. is built to move heavy loads out over jagged surfaces without cuts, bruises or snags.

Move more tons over the road on this tough, dependable General H.C.T. Longer wearing, safer running, quicker stopping.

THE GENERAL *L.C.M.*

THE GENERAL *H.C.T.*



GENERAL UNDERGROUND MINING TIRE

Extra thick side-walls and shoulders resist snags, cuts and bruises. Definitely gives more hours of uninterrupted work.

SPECIFY GENERAL TIRES ON YOUR NEW EQUIPMENT

Full steam ahead for National Defense!

Full steam ahead! That's the call of a nation rearming. Full steam ahead! That's the answer of the railroads who carry the mighty volume of raw materials, parts and finished products that America must have—and fast. And to get up "steam" the railroads need coal—this year *65 million tons* of coal!

This tremendous tonnage adds up to about 12% of all the bituminous coal mined in America. Approximately half of all railroad freight gets to where it's going under power supplied by coal!

Fortunately for the railroads and the many other large coal users—the coal industry is well-prepared to fill their demands. The steel mills—the public utilities—the rubber industry—thousands of manufacturers across the country—can be sure of the coal they need to arm America!

Better coal and more efficient production have always been the aim of America's progressive mine operators. Private management has invested hundreds of millions of dollars in modern preparation plants—research—improved equipment and new mine properties. Today the country's need for coal is great. The coal industry is ready—and able—to meet that need!

BITUMINOUS COAL
BITUMINOUS COAL INSTITUTE
A Department of National Coal Association

FOR NATIONAL DEFENSE...FOR PEACETIME PROGRESS

YOU CAN COUNT ON COAL!

For better service and more economy

Order from

a thousand and one

MACWHYTE WIRE ROPES

You'll get maximum service from wire rope that has been specially designed for each job. Over the years, ropes for all types of equipment in every field have been developed by Macwhyte. It will pay you to specify Macwhyte Wire Rope . . . engineered and job-proved for your particular equipment. Recommendations are promptly available from Macwhyte distributors or Macwhyte Company.

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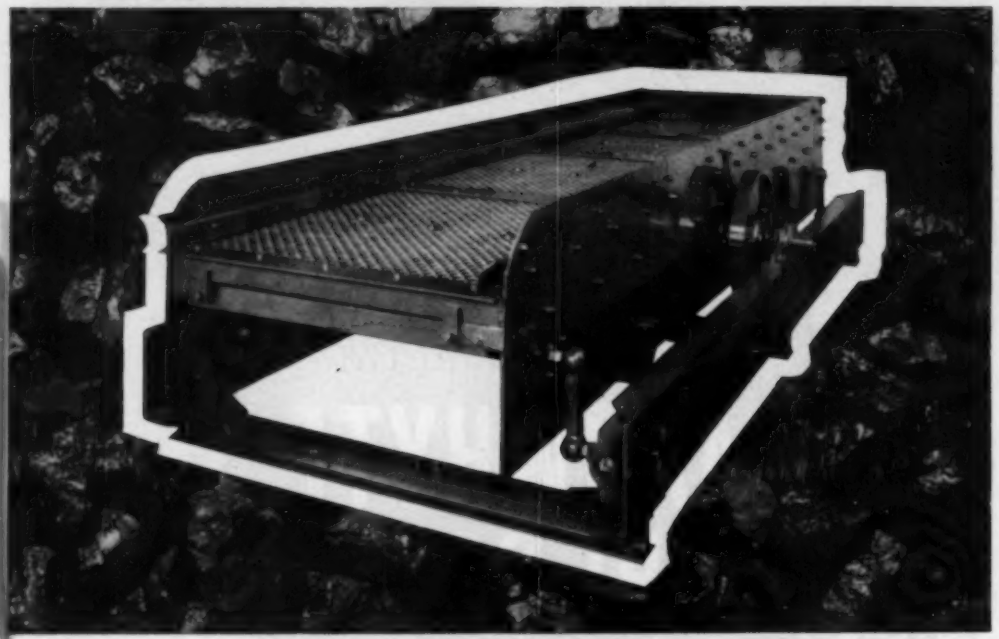
Mill depots: New York • Pittsburgh • Chicago • Minneapolis • Fort Worth • Portland • Seattle • San Francisco • Los Angeles.
Distributors throughout U.S.A. and other countries carry stocks for immediate delivery.

Manufacturers of Internally Lubricated PREformed Wire Rope, Braided Wire Rope Slings, Aircraft Cables and Assemblies, Monel Metal and Stainless Steel Wire Rope. Catalog on Request.

"Size Up" for Profits



At Lowest Cost Per Ton with SECO VIBRATING SCREENS

It's no problem to prepare the wanted size of clean coal in large quantities when you assign the job to smooth operating Seco vibrating screens.

These big, rugged Seco's in single, double and triple deck models have proven their ability, doing everything from scalping to final sizing on hundreds of coal screening jobs. Talk to any operator who has one or more Seco's. Learn why no other piece of equipment can match Seco vibrating screens for accurate sizing . . . for smooth, trouble-free performance . . . and for long life.

In the meantime, let us show you how this modern equipment can help you prepare clean, accurately sized coal for *greater* profits for you. Write today.

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TRUE CIRCULAR ACTION

VIBRATING SCREENS

Over 300 Models in Single, Double, Triple, and 3½ Decks . . . for Scalping to Final Sizing.

Check your coal preparation costs now! A Seco field man will bring you helpful modernization information or write for Coal Bulletin #11 Dept. M.

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1730 WALDEN AVENUE, BUFFALO 25, N. Y.

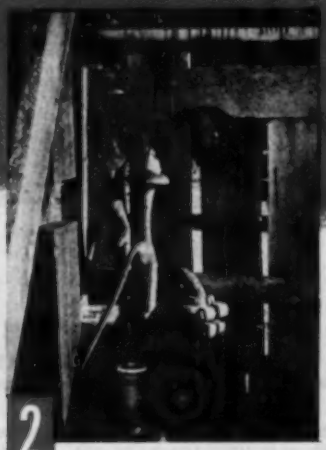
In Canada: UNITED STEEL CORP.

TORONTO, ONTARIO

5 GOOD WAYS TO INSTALL SHAFT OR BOREHOLE CABLE

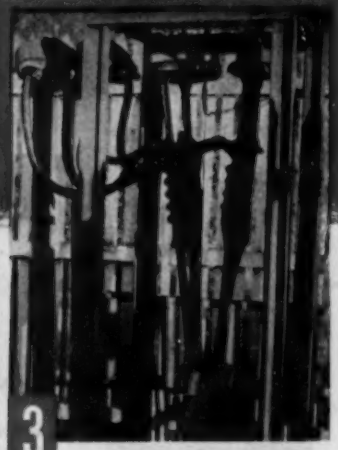
1

LIGHT-WEIGHT ALUMINUM BOREHOLE CABLE suspended by strain insulators clamped to conductors. This 5KV cable with ground wires is 3/c 350,000 CM with Hazard long-lived, high voltage Keystone oil-base insulation and an overall covering of a tough, moisture, flame, and weather-resistant Hazaprene ZBF Sheath. Borehole is 700 feet deep and carries a 2,300 volt a-c circuit to an underground rectifier station. Cable length is 1050 ft. from outside power line to underground station.



2

CONCENTRIC SHAFT-CABLE INSTALLATION 250-volt, d-c, 1,000,000 CM concentric cable suspended in conduit in shaft by means of I beams installed over shaft opening. Concentric conductor clamped, with copper strands bent back and refastened over clamp. Two 350,000 CM, 250-volt d-c cables also installed in shaft in conduit. These cables are supported from steel beams by strain insulators and clamps to conductors. All insulation is 600-volt Watertite with a protective sheath of Hazaprene ZBF.

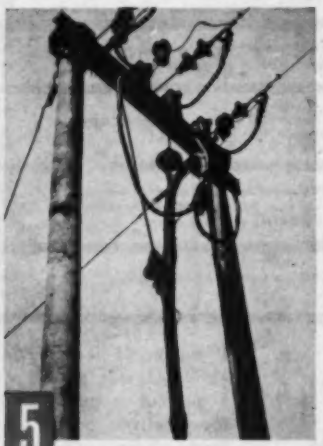


3

4 CABLE INSTALLATION suspended from simple steel structure. Each cable is 500,000 CM, carries 550 volts d-c with two positives and two negatives. Conductors have Hazard moisture-resistant, 1000-volt, Watertite insulation. Unequalled outside protection against moisture, flame, acids and mechanical damage is provided by tough Hazaprene ZBF Sheath. Borehole is 500 feet deep with cables held by strain insulators and strain clamps on conductors.

4

SIX D-C FEEDER CABLES installed in a 600-foot borehole. Each cable is 250,000 CM, with 600-volt Watertite insulation and a tough Hazaprene ZBF Sheath. A strain insulator with clamp connected to the conductor supports these cables individually from simple steel structure.



5

4100 VOLT TRANSMISSION LINE to underground pumping stations and power-conversion stations for d-c haulage and mining equipment. Cable is a 3/c, 4/0, 5000-volt Hazard Borehole cable with long-lived Keystone oil-base insulation protected over-all by a Hazaprene ZBF Sheath. Suspension is accomplished by two strain insulators and Kellems grips.

HAZARD MINE POWER CABLES ENGINEERED FOR BOREHOLE USE GIVE YOU A DIRECT, TROUBLE-FREE, ECONOMICAL CIRCUIT TO UNDERGROUND WORKINGS

THERE are many good ways to install borehole or shaft cable, and on this page are shown some typical methods that have proved successful.

Of vital importance, of course, to any borehole or shaft installation is the design and construction of the cable used. And there is a wealth of first-hand experience in the selection of mine power cables readily available to you. Over the years, much Hazard research and engineering has been devoted to developing specialized mining cables—in cooperation with mining engineers — that simplify installation problems and costs . . . that assure long, trouble-free service.

An experienced Hazard engineer will be glad to discuss your own particular operating requirements with you. Hazard Insulated Wire Works, Division of The Okonite Company, Passaic, N. J.

7983

HAZARD

COMPARISON PROVES the VALUE of VEELOS

the Adjustable V-Belt...

IF you use v-belts you'll be interested in this clear statement of facts about VEELOS, the link v-belt, and endless v-belts.

These 4 reels of Veelos provide up to 316 standard v-belt sizes.

COMPARISON TABLE
VEELOS and ENDLESS V-BELTS

Veelos V-Belts	Endless V-Belts
Any length can be provided for *any* v-belt drive due to link construction.	Standard or special lengths must be supplied for *individual* drives.
MINIMUM INVENTORY. 4 reels can care for every v-belt need in the O, A, B and C widths. No deterioration or obsolescence of spare belts.	LARGE INVENTORY. 316 sizes are required to provide a *complete* stock in the O, A, B and C widths. Spare belts not immediately used will age and deteriorate.
SMALL SPACE. It takes less than 2 square feet of wall or floor space to store 4 reels of easily identified Veelos.	LARGE SPACE. Walls and ceilings are often covered with stocks of endless v-belts. Identifying and maintaining full stocks is difficult and costly.
Installs quickly *on any drive* without resetting motor or tearing down outboard bearings.	Necessary to reset motor and tear down drives with outboard bearings.
Belts can be adjusted or replaced without moving the motor.	Sliding or pivoted motor bases are necessary to replace endless v-belts. Belts cannot be adjusted individually.
Full power delivery can be maintained because the tension of each belt in a matched set is kept uniform by removing or adding links.	Individual belts cannot be adjusted to maintain uniform tension and provide full power delivery.
No limitations are imposed by belt length.	Limited by the availability of standard or special belt lengths.

If you would like to learn more about Veelos—how it can save you money and keep your machines producing—write today for your copy of the Veelos Data Book. It's free and full of facts!

MANHEIM MANUFACTURING & BELTING COMPANY
MANHEIM, PENNSYLVANIA

VEELOS
THE LINK
V-BELT

...ADJUSTABLE TO ANY LENGTH...ADAPTABLE TO ANY DRIVE

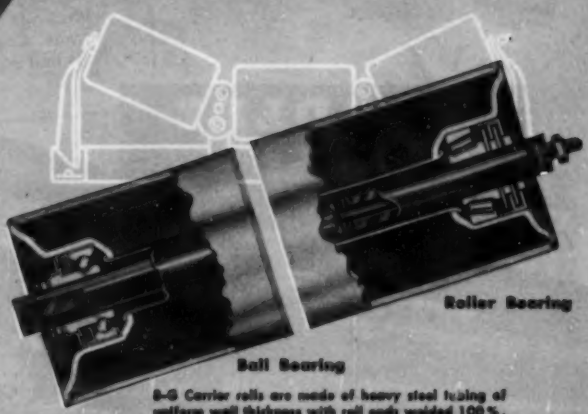
Made in all widths in three types: regular, oil-proof and static conducting. Also double V in A and B. Packaged on reels in 100-foot lengths. Sales engineers in principal cities; over 350 distributors throughout the country. VEELOS is known as VEELINK outside the United States.

A double check THAT SINGLES OUT B-G BELT CARRIERS

BUILT FOR LONGER BELT LIFE, LESS CARRIER MAINTENANCE...

Check the B-G Belt Carrier design and you'll find a combination of features that means long, low-cost service. Carrier rolls, for instance, stand out under rigid comparison: ¾" shafts . . . large, high-capacity ball or roller bearings . . . 100% welded and finished hubs . . . labyrinth grease seal . . . all are evidence of highest quality manufacture. Rolls are mounted on a heavy angle steel base with built-in 2° tilt for automatic belt training to assure continued accurate belt alignment and minimum belt wear.

If you are faced with Belt Carrier replacement — or if you're thinking of a new belt conveyor — get the full story on how Barber-Greene Carriers will stay true and smooth-running through more years of service.



B-G Carrier rolls are made of heavy steel tubing of uniform wall thickness with roll ends welded 100%.

OVER 80 STOCKING DISTRIBUTORS

Rolls are mounted on all steel, jig-welded self-troughing angle.

Also, fast, reliable B-G Distributor service can help prevent shutdowns and minimize time lost when conveyor trouble occurs — many carry B-G Belt Carriers in stock, available for fast delivery.

Your B-G Distributor offers carriers in three roll diameters (4", 5", 6")—and in 18", 24", 30", 36" and 42" widths. These as well as impact and self-aligning B-G Carriers are fully described in Catalog 76C. Write for your copy.

Barber-Greene

AURORA, ILLINOIS

Yardley

M-3 and M-3-S

PLASTIC

MINE PIPE

for every purpose

Whatever the need . . . for air and water systems, pure or corrosive, suction or discharge . . . we make the right type of plastic pipe from a high-impact material that withstands normal use. Won't rot, rust or corrode. Complete line of all necessary fittings and adapters.

YARDLEY
PLASTICS CO.
142 Parsons Ave. · ADams 9315
Columbus 15, Ohio

M-3 with cement-type sleeve coupling.

M-3 with bell or flared end.

M-3 with male adapter and threaded coupling added.

M-3-S with threaded end and coupling.

M-3-S STANDARD PIPE SPECIFICATIONS

PIPE SIZE	APPROXIMATE WT. LBS. PER FOOT	NOMINAL I. D.	NOMINAL O. D.	CALCULATED BURST PRESS. P.S.I. at 80° F.
½"	.118	.622	.840	1000
¾"	.161	.824	1.050	900
1"	.212	1.050	1.315	800
1¼"	.316	1.380	1.660	700
1½"	.378	1.610	1.900	600
2"	.508	2.070	2.375	500
3"	1.030	3.068	3.500	481
4"	1.470	4.026	4.500	410
6"	2.560	6.065	6.625	330

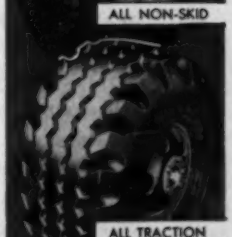
M-3 STANDARD PIPE SPECIFICATIONS

PIPE SIZE	APPROXIMATE WT. PER FT.	NOMINAL I. D.	NOMINAL O. D.	CALCULATED BURST PRESSURE P.S.I. AT 80° F.
½"	.05	.500	.600	840
¾"	.075	.750	.855	625
1"	.136	1.000	1.140	600
1¼"	.2	1.250	1.420	600
1½"	.23	1.540	1.730	538
2"	.345	2.030	2.250	470
3"	.535	3.000	3.250	375
4"	.880	4.000	4.300	342
6"	1.940	6.000	6.440	335

M-3 an M-3-S furnished in random 20-foot lengths. Recommended for working pressures up to 20% of calculated bursting pressures where temperatures do not exceed 125°.

TIRES that stand up longer... SERVICE to see that they do

BOTH ARE YOURS AT Firestone



FIRESTONE TIRES DO STAND UP LONGER—

Because — More materials go into them — Their treads are extra heavy . . . Their sidewalls are double thick . . . Their bodies are reinforced with four extra tread plies.

Because — Better materials go into them — Their rubber is extra tough, extra resistant to cuts, scuffs, and snags. The rayon cords in their body structure are Gum-Dipped under tension for enduring strength and stretch resistance.

AND . . . FIRESTONE SERVICE HELPS YOU GET THE MOST OUT OF YOUR TIRES—

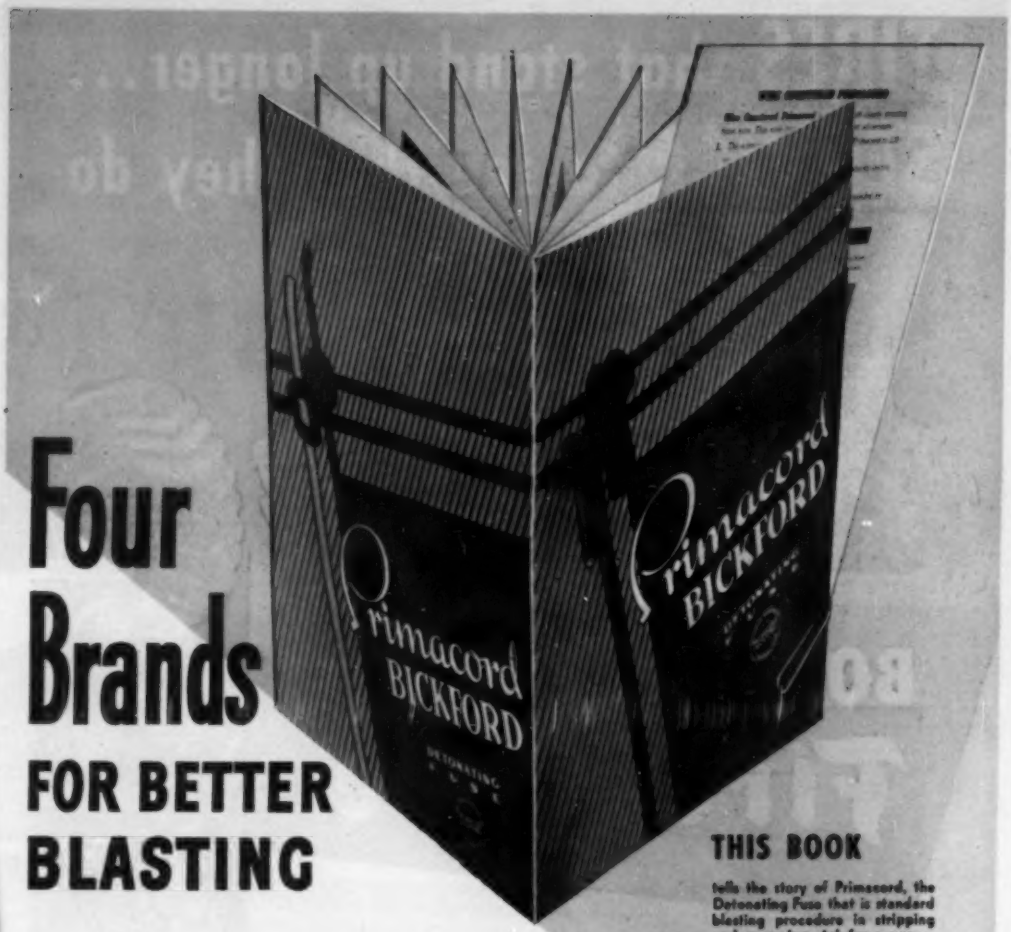
Because — Your Firestone Service Representative will see that you get the right type of tire for the job and the right size and ply tire for the load.

Because — He will also at regular intervals inspect your tires and furnish the necessary service to see that you get the most out of them.

CALL YOUR NEARBY FIRESTONE DEALER OR STORE FOR THE BEST IN TIRES AND TIRE SERVICE

Listen to the Voice of Firestone on radio or television every Monday evening over NBC

Copyright, 1951, The Firestone Tire & Rubber Co.



Four Brands FOR BETTER BLASTING

THIS BOOK

tells the story of Primacord, the Detonating Fuse that is standard blasting procedure in stripping and quarrying. Ask for a copy.

As shown on the booklet from left to right: Plastic Reinforced Primacord for very deep, wet holes, river crossings, etc. . . . Plain Primacord, for surface trunk lines and shallow holes . . . Reinforced Primacord for deep holes where extra tensile strength or resistance to abrasion are desirable . . . Wire Countered Primacord for deep, ragged holes and high abrasive conditions.

Choose the brand that meets your conditions and you will also choose safety, simplicity of hook-up, ease of use, freedom from the danger of stray currents, and best results from a minimum quantity of explosives.

THE ENSIGN-BICKFORD COMPANY
Simsbury, Connecticut
Also Ensign-Bickford Safety Fuse — Since 1836

P-53

PRIMACORD-BICKFORD Detonating • Fuse •

Devoted to the Operating, Technical and Business Problems of the Coal-Mining Industry

Coal Age

APRIL, 1951

IVAN A. GIVEN, EDITOR

New Angle

MINING COST, because of its vital role in determining coal's competitive power, has always been a matter of prime concern to producers. From where the consumer sits, however, transportation from the mine to the point of use is almost equally important. With good reason for believing that coal is being asked to assume more than its fair share of railroad rate increases, the need for investigating other possible forms of transportation becomes even more important.

Though the railroads undoubtedly will remain the dominant transportation medium for some time to come, a partial shift from rail to water and motor trucks already has occurred, with a growing number of coal-producing companies directly operating water and truck facilities. Now, in addition, overland belts are proposed, large-scale experiments are being arranged to determine the economics of regular truck service, and the Hanna Coal Co. will install a pilot coal-pumping system to obtain the facts on which a commercial-scale system may be built. If, as expected, these efforts pay off in lower transportation costs, coal's competitive position will be solidified that much more.

Basic Approach

HOW FAR should research to broaden coal markets and cut mining costs go? Up to now, the program has been admittedly inadequate, with emphasis on trying to whack up available funds rather than on finding out what the needs really are. The bituminous industry, however, is moving to remedy the situation with a down-to-earth determination of what ought to be done. When that determination is made, the industry should be ready with the money. If the rate turned out to be, say, 2c per ton, that would be $20 a day for a mine turning out 1,000 tons. If the gross was $5,000, the contribution rate would be 4 mills per dollar of realization. The annual contribution, on a 200-day basis, would be more than returned by one extra day's operation. If the bituminous market was increased only 2,000,000 tons a year, that extra day's operation would be assured. A real research program can certainly guarantee more than that.

The Other Face

"READY TO SERVE" reflects coal's stand in the defense build-up. It is fully aware of one of its major obligations—the need for keeping itself strong and able to produce in spite of the increasing flow of steel, copper and other critical materials into the military pipeline and the growing movement of men into the armed forces. And in this, it has the help of a number of government agencies specifically set up to protect the flow of coal.

But there is another face to the coin. Coal has the further obligation of seeking out additional opportunities for serving the national interest. To be specific, coal should be in Washington looking for the opportunities presented by new military and defense projects, by the expansion of existing fuel-burning installations, and by conversion from other fuels. To date, the industry has largely stood back while oil and gas have vigorously pressed their cases with governmental bodies—such as the Munitions Board—which can and do fix fuel policy. Coal needs a more definite plan for getting its story to the right agencies and the right men in government. In so doing, it can help not only itself but also the Nation by conserving other fuels for those military and essential civilian needs where nothing else will serve as well.

MODERN MINING underground and bigger, better machines for stripping are anthracite's best bet to beat high costs.

Anthracite Mid-Century

Looking Back 50 yr
- How Much Progress Made?
- Where Were the Turning Points?
- What Are the Lessons From the Past?

Looking to the Future
- How Strong Is the Industry Now?
- What Are the Prospects for Growth?
- How Achieve a Brighter Future?

"IN THE FUTURE, it will be difficult to supply the demand for anthracite even in the territory in which it is now generally used, not to mention any demand which may arise from newly developed territory."

That was how anthracite's future looked in 1908 to William W. Ruley, chief, Bureau of Anthracite Statistics, as he wrote the annual report for the U.S. Geological Survey.

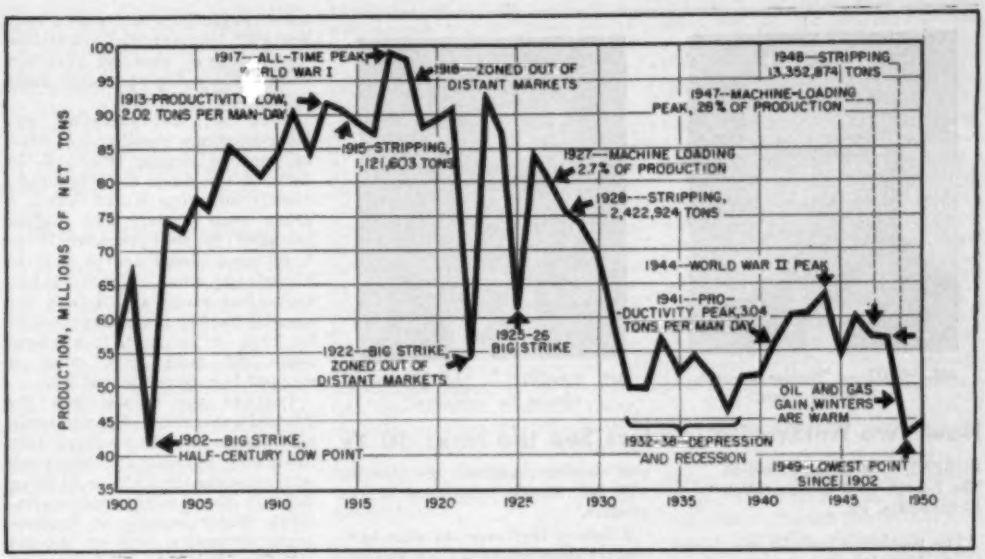
Today, in the mid-century year, anthracite still is a troubled industry, but for a reason different from that Mr. Ruley envisioned. Plagued by a series of warm winters since the war, postwar easing of oil supplies and a growing tangle of natural-gas pipelines through its market area, anthracite doesn't fret about supplying the demand. The industry's big problem is to keep present demand alive and to create enough new demand to sustain anthracite as a going enterprise.

In spite of this turn of events, anthracite is not embarrassed by the ups and downs of its past nor is it gloomy about its future. The industry, including its workers, is in a fair way of learning from its disturbed history and turning its merits to present advantage. It now enters the second half of the century with conviction, courage and a will to make the next 50 yr better for itself and its customers.

Where did the industry stand half a century ago?

What were the turning points in its history and the sources of its strength and weakness?

What is the outlook from this, the mid-century year?



ANTHRACITE PRODUCTION reflects complex factors — labor costs, strikes, competition, wars, weather and mining methods.

The First Half Century

Fifty years ago, in 1900, the industry produced 57,368,000 tons valued at $85,758,000, or $1.49 per ton. Capital investment was a little under $240,000,000. The big companies operated at a loss and depended upon their "captive" railroads for the black ink on their ledgers. Efficiency was 2.4 tons per man-day and the average wage was in the area of 22c per hour. Fatal accidents were 7.16 per million tons mined. Mining was done with muscles, mules and steam.

In 1950, half a century later, anthracite produced 44,400,000 tons valued at $389,000,000, or $8.38 per ton. Capital investment now has more than doubled. For their earnings, companies look to efficient mining that keeps cost at a minimum, a quality product and good salesmanship. Efficiency is in the neighborhood of 2.9 tons per man-day and the miner's basic daily wage is $16.35. Fatalities in 1950 were estimated at only 2.07 per million tons. Mines now are extensively electrified and mechanized.

Thus many changes came in the intervening years, sometimes slowly, sometimes rapidly and violently. They touched upon all aspects of the industry—mining methods and machinery; labor, public and government relations; markets and merchandising; deep mining and stripping. And they showed up in peaks, valleys and plateaus of production — a rising curve stretching upward from 1900 to a peak of 99,612,000 tons in 1917, a leveling-off through 1924 at an average of nearly 90,000,000 tons, a falling-off in the wake of the great strike in 1925-26 and through the depression years, a rise to an average of nearly 60,000,000 tons in World War II, and a decline again in the recent postwar years to 44,400,000 tons in 1950.

Machine mining came slowly to anthracite. Indeed, for the first 25 yr of the century, demand on the whole outstripped supply, as Mr. Ruley had predicted, there was little in this situation to spur mechanization. Besides, steeply pitching seams were an obstacle to machines, especially in the southern fields, and the mineworkers resisted mechanization in the belief it threatened their jobs. Though these last two obstacles have since diminished somewhat with the design of special equipment for working pitching measures and with the miners' growing understanding of the industry's problems, they still cannot be entirely written off even now, in 1951.

In 1900, only three kinds of electrical equipment were available for coal mines—generators, cutters and locomotives. That is not to say they were widely used. By 1914 in fact, only 79,811 kw of generating capacity was employed by the anthracite industry, though electric pumps, hoists, breaker machinery and some miscellaneous equipment had been placed on the market and improvements had been made in machine design and in mine cars, cutters and drills.

By 1925, considerable progress had been made in mechanization, much of it induced by decreased manpower and increased demand during World War I. Though mules and muscles still played big roles, electric locomotives, both trolley- and battery-type, had caught on, with large additions to horsepower and improvements including steel wheels, ball bearings, solid gears, electric and dynamic braking. Cutting machines had begun to move in in considerable numbers after 1910. Scraper conveyors made their bow in 1916, especially in thin seams of the northern field, and grew slowly in favor in the years following, along with chain and shaker conveyors. These still are the mainstays of the industry in level-seam mining. With increases in electrical equipment, better protection was provided, including improved starting devices, circuit breakers, automatic substations, automatic controls for pumps.

Progress in labor relations was

High Costs and Competition Shackled Anthracite After World War I

MR. WHITE — "Brighter prospects than for many years."

MR. KENNEDY — "An increasing demand for anthracite."

How Two Anthracite Leaders See the Next 50 Yr

ROBERT V. WHITE, President
The Lehigh Coal & Navigation Co.
Philadelphia, Pa.

The population and the new homes in the United States are still gaining and according to the Bureau of Census will continue to gain for at least the next 50 yr. Since 1932 the increase in population and in new homes, together with the new burning methods for small sizes of anthracite and new methods of preparation on which save very small-size coal previously wasted, has brought about materially increased sales of anthracite in every year except the very warm winters of 1938, 1949 and 1950.

Over the next half-century I believe the anthracite-producing industry is faced with brighter prospects than for many years. Under normal operating and weather conditions, the industry will sell all the anthracite it can produce.

I believe that over the next half-century there will be still newer burning methods for small sizes and a greater use of anthracite in industrial plants. The inroads of oil and gas will be more than made up by new homes which are constructed to use anthracite-burning equipment.

THOMAS KENNEDY, Vice President
United Mine Workers of America

Significant developments in the fuel situation throughout the country indicate that there will be an increasing demand for anthracite and it is my judgment that future trends as affecting the anthracite industry and its markets will continue to show consistent improvement.

equally solid, especially preceding World War I. The big strike of 1902, which stretched from spring to fall and finally was settled by intervention of the President and the award of the Anthracite Strike Commission, resulted in a contract that has been the basis of labor-management relations in the anthracite field since that time. The commission's award and the solidarity of the union, besides winning gains for the miners, stimulated the operators to drive for stabilized markets, change mining methods, improve safety and working conditions, and set up a distribution pattern.

Though there was a long strike in 1906, followed by long stoppage in 1912 and 1922, labor relations on the whole remained stable and the basic agreement was renewed, with modifications, at intervals of 3 yr or more through 1921. The Board of Conciliation, created by the Strike Commission and made up of three members each from operators and miners, maintained harmony and conciliated disputes. It still performs the same function.

Supplementing industry-wide labor-relations efforts, individual operators cemented miner goodwill locally. First-aid classes got their start here long before spreading to other industries. Operators appointed safety managers and committees and sought to win miner favor by education through lantern slides, leaflets and magazines.

The operators also improved working conditions. With the advent of machines and electric power, manual labor became less burdensome. Cap lamps changed from oil to carbide to electric. The 8-hr day and the 5-day week gradually caught on. Bath houses were provided, underground ventilation was improved, shooting practices were made safer and wage rates were lifted.

Even so, mechanization and labor-relations stability did little to improve mining efficiency. In fact, in the flush markets immediately following World War I, a great many cutters and loaders installed in the preceding 5 to 8 yr were abandoned or sold to bituminous mines. Where productivity had stood at 2.4 tons per manday in 1900, it was down to 2.17 by 1910. After 1910, it averaged about 2.2 until 1924, when it dropped to a record low of 2.0.

Part of the trouble was the gradual exhaustion of easily workable seams and the resulting turn to thinner, pitching and previously worked seams. In addition to being difficult, these were costly operations. Water became an increasingly expensive problem as old workings overflowed into working rooms and entries.

Costs Soar in 20's

Failure to maintain productivity, plus miners' resistance to mechanization and the union's failure to encourage a change in attitude, brought an upward spiral in costs. The value per ton rose from $1.49 in 1900 to $1.90 in 1910; $2.07 in 1915; $4.85 in 1920; and $5.43 in 1924.

Meanwhile, during World War I the federal government set up distribution controls and thus zoned anthracite out of its 2,000,000-ton Southern market and its 10,000,000-ton North-Central market, as well as some close-at-home markets where bituminous was in good supply. Later, during the 1922 strike, the Commonwealth of Pennsylvania, aided by operators and federal officials, reimposed distribution controls to spread scarce supplies. Householders learned in these periods that they could burn bituminous and coke satisfactorily and also that the smaller sizes of anthracite, always sold at a loss and available to some extent during the strike, burned well in the right equipment. Rising freight rates did nothing to help the situation.

Thus, when the disastrous strike of 1925-26 hit, anthracite already was handicapped with:

1. Limited mechanization.
2. Difficult, high-cost mining.
3. Miner resistance to machines.
4. Operators' unfamiliarity with

any market condition except excess of demand over supply.

5. A shrunken market area.

6. A number of customers who, having been forced to use competing fuels, had to be re-sold on anthracite.

7. A budding oil industry looking for new markets, especially in home heating.

Strike's Effects Lasting

The big strike lasted from September to February. For the miners, it was pointless. They gained nothing, not even a check-off. For anthracite's customers, it was annoying but not serious. But for the industry, the strike was calamitous. Customers made effective use of substitutes. New England governors set up a fuels committee that helped retailers connect with producers of semi-bituminous and instructed householders in the art of burning competing fuels. West Virginia smokeless coals invaded the Eastern market. Some Welsh anthracite was imported. The railroads helped by moving bituminous in from distant points. And, in an ironic twist, Anthracite Coal Service, as a help to the industry's customers, urged its member retailers to stock substitute fuels during the strike.

Though the industry appeared to bounce back after the strike, with 84,437,000 tons in 1926, the bounce did not last. Oil and bituminous had gained a foothold. With the 1929 crash and the depression compounding the injury, production fell steadily to 49,541,000 tons in 1933. After that, output hovered between 50,000,000 and 60,000,000 tons, with a low of 49,066,000 in 1938 and a top of 63,701,000 in 1944.

Likewise, value at the mines, reaching a shortage-inspired $5.62 in 1926, fell off after the strike to $5.11 in 1930, $4.03 in 1935 and $3.64 in 1939. The upward turn did not come until 1940, when national defense started up.

Most anthracite leaders had foreseen the troubles that plagued the industry after the big strike. Their vision, together with the realization that some of the industry's weaknesses were in-bred, galvanized them to action. If they had not moved fast and wisely, their plight might have been worse than it turned out to be.

In a strong effort to recover markets, Anthracite Coal Service increased its staff and opened more offices. Its engineers advised customers on burning smaller as well as conventional sizes, set up training courses for retailers and employees and organized an advertising program with plans to spend $500,000 per year in 1927, 1928 and 1929.

The Anthracite Operators' Conference also organized and maintained an inspection service to guarantee fulfillment of specifications on size and quality; set up the Anthracite Equipment Corp. to promote and finance the sale of heating equipment and controls; put the Anthracite Institute in business as a public-relations institution; and started a program of research looking to new and improved equipment, better preparation and broader markets. Later, in 1930, the industry consolidated most of its agencies in Anthracite Institute and opened a testing laboratory and inspection service for equipment.

Industry Promotion Pushed

In November, 1927, operators, miners, distributors, consumers and business interests in the anthracite-producing region met at Mt. Carmel to air their troubles and seek ways to keep the five-county region prosperous. Major result of this meeting was establishment of the Anthracite Cooperative Committee to educate people to the vital need for keeping anthracite healthy, to seek fair treatment in taxes and freight rates, and to extend markets.

Individual operators meanwhile put more strength into their merchandising programs, enlarged their breaker capacity, especially for recovery and treatment of smaller sizes, and improved their mining methods.

Some change in the attitude of labor was noticeable following the great strike. Aware of the damage done by the protracted stoppage, the union joined peacefully in writing an agreement extending over the next 5½ yr.

Pressed by the urgent need of cutting costs and encouraged by some abatement, though slight, in miners' opposition to machine mining, the industry renewed its efforts to mechanize. The quantity of anthracite cut by machine moved sharply upward after 1925-26 and mechanical loading began to gain headway. Scrapers and shaking conveyors, some of which were equipped with duckbills, carried the main burden, especially in thin seams where the pitch was too steep for mine cars or not steep enough for shutes. Pit-car loaders and some belts moved in about 1930. Between 1927 and 1935, mechanical loading units, including scrapers, conveyors and pit-car loaders, increased from 464 to 1,545; tonnage handled mechanically, from 2,223,000 to 10,828,000.

Machines were supplemented by better-designed corrosion-resistant pumps with automatic controls, bigger and better fans, improved power distribution, centralized generating equipment, spreading use of synchronous motors, automatic controls for motor-generator sets and compressors, and improved materials and construction for machines and equipment.

Strip Output Gains

In addition to mechanizing underground mining, producers turned to stripping as a major cost-cutter. Though the miners accepted it with reluctance—and still do—strip mining increased steadily after 1929 to a level of nearly 6,000,000 tons in 1934. This, together with growing machine use, pushed productivity up from 2.17 tons per man-day in 1929 to 2.53 in 1934 and 2.68 in 1935.

Preparation-wise, though the industry had set up quality standards many years back and had pioneered in the use of cones, jigs, washers, thickeners, screens and concentrating tables to recover fine sizes for market and reduce stream pollution, a rapid increase in the newer types of cleaning equipment set in after 1926. Rheolaveur and Chance sand-flotation installations gained headway, the size of conventional jigs increased and there was spreading use of corrosion- and acid-resistant materials for screens, chutes, pipe and other equipment. By 1938, recovery and treatment of fine sizes had been so successful that two new marketable buckwheat sizes, Nos. 5 and 6, had been developed.

The trend to recovery of finer sizes not only conserved a valuable natural resource. It also made it possible, because of improved preparation methods, to increase mechanical mining, mine dirtier seams and reduce stream pollution, which had become a political as well as economic issue in the anthracite fields.

Market-wise, the trend to smaller sizes had led long before to abandonment of lump and steamboat sizes and to reclassification of pea as a domestic size. The low

price of small sizes, usually sold by the producers at a loss, spurred consumers to develop equipment adapted to small sizes. This in turn created a demand that enabled producers to obtain a fairer price for this product. The domestic stoker and the magazine central heater, both well developed by 1930, sped the trend to buckwheat and even smaller sizes in the home market.

On the industrial market, traveling grates and suspension burners had made it feasible as early as 1921 to utilize sizes down to 200-mesh. This opened a market that still is capable of enlargement. Meanwhile, in the middle '30s, non-fuel uses absorbed increasing quantities of anthracite and gave promise of larger sales in the years ahead. Principal among the 24 non-fuel uses listed by the Bureau of Mines in 1937 were water filtering, iron-ore sintering, zinc reduction and steel carbonization.

All this, however—increasing mechanization, better preparation and the search for firmer and broader markets—could not stave off the readjustment that took place in 1938 and 1939. The truth was that the 7-hr day and 5-day week instituted in 1937, without loss of take-home pay, was costly while, at the same time, mine prices dropped to a low of $3.64 per ton in 1939. The depression of the early '30s, which the industry had gone through without disaster, finally caught up with anthracite in the general recession of 1937-38. "Bootleg" anthracite, which was reaching markets in ever-increasing quantities, only made a bad situation worse.

Production Allocated

The upshot was that 1939 was a year of bankruptcy, retrenchment reorganization, and a collapse of the price structure.

To recoup their strength, early in 1940 independent and old-line operators, with the approval of the governor of Pennsylvania and cooperation of the UMWA, agreed to a voluntary allocation of production. In addition, to stabilize sales, legitimate producers agreed to buy bootleg output and hire bootleg miners. Though these moves did not end the distress, they did ease it. Over-production was curbed and the anti-bootleg program was measurably successful.

In addition to the industry's own efforts to recover its strength, the Anthracite Coal Commission was set up to seek ways to improve economic conditions in the anthracite-producing region. The commission recommended in 1941 that war plants and permanent industries be located in the region, vocational schools be organized to form a pool of skilled labor, mine flooding be surveyed, automatic heating equipment be further developed, industrial markets for anthracite be expanded, the Bureau of Mines establish research laboratories, the region be reforested and a study be made of depletion of reserves.

Higher Costs Fought

Though the coming of World War II, with growing shortages of fuel oil and coke, a squeeze in manpower and materials and a big boost in fuel needs, softened the urgency for cost-cutting, the industry nevertheless held to its charted course.

To offset higher costs resulting from wage increases, portal-to-portal pay and rising prices for machinery and materials, operators turned to stripping and, with the help of the Bureau of Mines, undertook a study of possible improvements in underground mechanization. By 1944, producers were stripping nearly 11,000,000 tons—twice as much as was stripped in 1939.

To meet wartime demands, the industry went on a 6-day week and accepted, patriotically but reluctantly, an SFAW ban on shipments south of Virgina and the District of Columbia and west of New York, Pennsylvania and Maryland. Industrial consumption increased considerably, with a notable increase in the quantity of fines blended with bituminous to make metallurgical coke.

The stream of progress did not by-pass the householder. Anthracite Institute continued to test heating equipment and to seek new ways of burning anthracite economically and conveniently. To mention only one item, the "Anthratube," which was announced in 1944, was a result of this program. The industry likewise strengthened its ties with architects and builders with a view to capturing customers in the expected postwar housing boom.

The end of World War II eased the shortage of machines and materials and, with a new wage agreement in 1946 providing a pay boost, more paid holidays, more vacation pay and a health-and-welfare fund, eased some of the industry's labor-relations and production problems, though the cost problem remained a tough one. Productivity, having reached a peak of 3.04 tons per manday in 1941, settled down to a level of about 2.82 in the postwar years.

Postwar Effort Set

With wartime pressures reduced, Anthracite Institute started up studies of extrusion and pelletization of fines looking to oxygenation and gasification, fluidized-bed gasification of silt, improvement of domestic space heaters and industrial boilers, and broadening of non-fuel uses. Likewise, producers joined with the Bureau of Mines in underground experiments with new-type shearing, loading, timbering and packing machines; extended their studies of flooding; and watched with interest the construction of the Bureau's laboratory at Schuylkill Haven. Meanwhile, in 1948, Anthracite Institute launched a big advertising campaign, supplemented by efforts of individual producers, to sell the merits of anthracite as a home fuel. Lately, this campaign has been extended and enlarged. The union, aware of shrinking markets and the threat to its members' jobs, has professed its desire to cooperate.

Necessarily, much of the industry's postwar program is a rear-guard action aimed at holding on to present markets and preventing further inroads by competing fuels. That is not an easy task. In 1947 fuel oil, for the first time, moved ahead of anthracite in the anthracite market area on an equivalent Btu basis. Conversion of the Big and Little Inch lines from oil to natural gas and construction of new coastwise and eastward-reaching lines brought big quantities of gas into anthracite's domestic markets along the Atlantic Seaboard. Soon natural gas will reach New England, long an anthracite stronghold. Thus a rear-guard action is of first importance.

But anthracite's hopes reach beyond a rear-guard action. With equal vigor, anthracite is determined to enlarge present markets and develop new outlets and thus to level off on a higher plateau of production, efficiency, stability and service to its customers.

The Next Half Century

Looking ahead to the next half-century, anthracite can appraise its present position thus:

Factors Threatening Anthracite

1. Stronger competition from oil and gas in the home market.

2. Less easily-minable coal, with mechanization difficult and costs higher.

3. Increasing efficiency in burning equipment, wider use of insulation in homes and a growing number of multiple family dwellings, all tending to reduce tonnage needs.

Factors Favoring Anthracite

1. Geographic location in a densely populated area.

2. Anthracite's merits and availability as a household fuel.

3. Long experience in merchandising and public relations, with an industry-wide organization to put experience into practice.

4. Teamwork among producers, miners, the union and the region's business interests based on the realization that the welfare of the entire area depends upon a healthy anthracite industry.

5. A rounded research program, looking to wider home and industrial markets and better uses.

6. A good chance at a fair share of the fuels market in the Nation's growing defense program.

7. A potential industrial market, still virtually untapped.

With favorable factors outweighing unfavorable, how can anthracite turn the future to advantage?

The following needs stand out as the industry moves ahead into a new half-century:

1. **Low-cost equipment to regain preference for anthracite among householders.** The industry's most advanced burning unit, the Anthratube, still cannot match the pushbutton conveniences of oil and gas burners. Anthracite users still have to handle ashes. Besides, the machine sells for a fancy price, plus installation, compared to the price of an oil or gas burner.

To regain the home market, the industry's biggest need is a package unit that will cost the customer no more than an oil or gas burner. The package would include boiler, burner and bin-feed screw, as at present, plus facilities for transferring ashes automatically to a sealed storage compartment that need be opened only once a year or from which the ashes could be removed by suction to a tank truck.

Admittedly, this ideal piece of equipment could not be built to undersell oil and gas burners. It would have to be sold at cost or below, in the same way as safety razors are sold. In the sale of razors, blades earn the profit. In the sale of an anthracite burner, repeat sales of coal would make the profit.

Doubtless this plan would require a subsidized industry-wide corporation to manufacture, promote, sell and install burning equipment, either directly or in close cooperation with established distributors.

2. **Better consumer service.** Though there is substantial agreement that better service would help anthracite with its domestic customers and though some work has been done along these lines, the hard fact is that the goal must be convenience equal to or greater than that provided by gas or oil. This means, among other things, that the householder must not be required to do anything more than set his thermostat, in addition to being relieved of all work and the nuisance of handling coal and ashes.

The answer is a delivery, ash-removal and heating service that provides all these benefits at an attractive cost. As noted, some work has been done along these lines, thus taking care of at least part of the pioneering. If and when completely developed, equal or greater convenience would be added to lower cost, thus making an almost irresistible combination. Logically, also, the service function might well be added to the scope of the equipment corporation's activities, with the corporation either handling service directly or assisting retail distributors in setting it up and carrying it through.

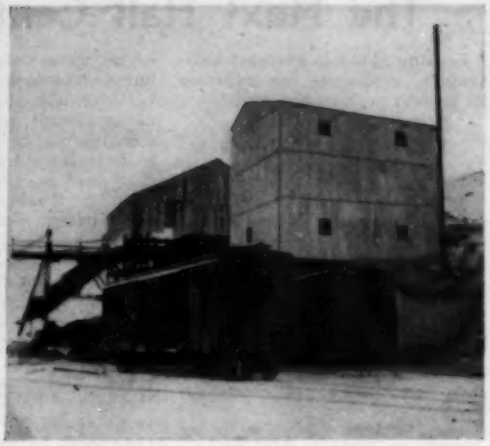
3. **Lower mining costs.** Methods and equipment now under study promise some help in this direction. From underground mining, new-type machines are under study for shearing longwall faces, mining steep-pitching seams, longhole shooting and augering. Further centralization of mining and preparation, together with increased stripping, are further keys to lower cost. With production activity shifting from north to south as the northern fields yield less coal, stress on stripping necessarily will increase and the search will broaden for machines that will work successfully in the thicker, steep-pitching southern seams.

4. **A new type of market.** "Anthracite's future lies in the industrial market," some industry spokesmen contend. They have not written off their domestic customers but they are shifting their major sales efforts in the direction of heavy-industry uses. Their argument has some merit, for anthracite lies close to busy industrial concentrations — from Baltimore northward to New York and New England. As the Nation's standard of living rises in peacetime or as fuel demands soar in the defense program, more fuel will go to power plants, factories, mills and railroads. Buckwheat at $4.50 per ton—the current going price is competitive with bituminous and heavy fuel oil in at least part of the anthracite market area.

Aggressive salesmanship can open this big, steady industrial market, largely unaffected by weather, to anthracite. Thus the base of anthracite's market would become heavy industry, with the seasonal domestic market providing the garnish to the main dish.

5. **Conversion of anthracite to gas or liquid fuel by low-cost methods.** Millions of tons of fines from culm banks and silt from river bottoms are recoverable at negligible cost. Given processes that will convert these to gas or liquid at costs competitive with natural gas and fuel oil, anthracite could move with equal success into broader domestic and industrial markets.

These, then, are some of the roads anthracite may well follow to gain more business in the next half century. The going will not be easy, but the solid achievements of the past plus hard work and ingenuity in the years ahead can convert promises into realities and thus bring about a better future for stockholders, management and men.

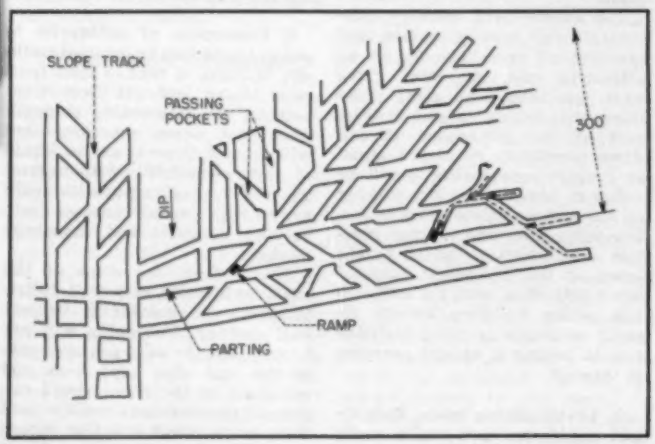


MECHANICAL LOADING UNDERGROUND plus crushing, screening, washing and dustproofing on the surface are the basic factors in noting efficiency and assuring quality at the Smokeless and Sootless mine of the Brophy Coal Co.

Modernizing for Efficiency

Big Drop-Bottom Cars and Haulage Rearrangement Are Latest Steps in 10-Yr Brophy Coal Co. Program Starting With Trackless Mining at the Face for Efficiency and Ending With Mechanical Cleaning on the Surface for Quality

REARRANGEMENT of the haulage system and installation of big, modern, drop-bottom cars is the latest step in the history of improvements at the Smokeless and Sootless mine of the Brophy Coal Co., Red Lodge, Mont., designed to convert this old property into an efficient, flexible operation shipping a high-quality product.



TYPICAL PANEL-DEVELOPMENT PLAN, with rooms driven up the pitch on a 45-deg angle, showing ramp locations and shuttle-car passing pockets.

• **Modernization Steps** — Opened originally in 1922 by James F. Brophy, the present Smokeless and Sootless workings were taken over by his son, James R. Brophy, and reopened in 1940. Major steps in the rebuilding and modernization program since that time have included the following:

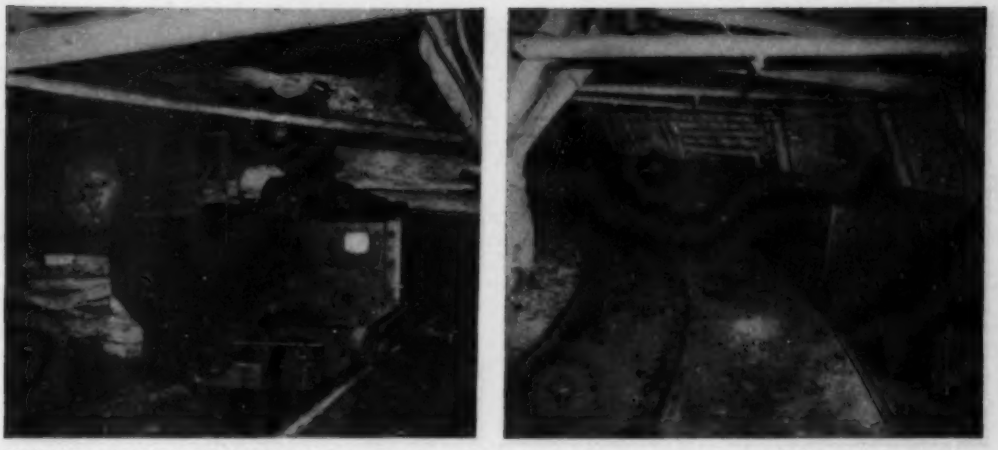
• 1940—Installation of a Joy 8 BU loading machine and 42-E5 cable-reel shuttle car—the 68th car produced by Joy and now in its eleventh year of service on its fourth set of tires.

• 1944—Second 8 BU, Dooley 575 drill, car-loading elevator, Joy shortwall truck and second shuttle car, a Joy 42-E10 elevated discharge unit, also cable-reel with two-wheel drive and steer

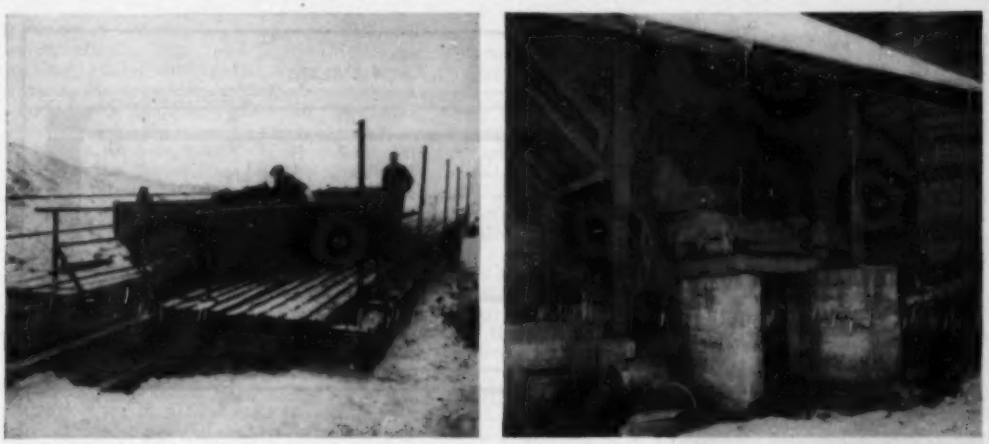
• 1947—McNally Pittsburg washing addition for nut and stoker coal went into operation Feb. 20.

• 1949—Viking hot-oil dustproofing system for nut and stoker; Jeffrey bugduster for one of the two shortwall cutters in service.

• 1950—Installation of storage



NEW HIGH-CAPACITY DROP-BOTTOM CARS represent latest step in the mine improvement program. At the left, a new car is being loaded, with the shuttle car on a timber ramp. View at right shows an empty trip on the parting at the mouth of a panel entry.



90-TON DUMP HOPPER (left) accompanied haulage modernization and rearrangement of the preparation circuit, the latter including installation of a mine-run crusher and belt under the hopper (right).

bin, Jeffrey mine-run crusher and 16 4½-ton Sanford-Day 1-2-3 Automatic drop-bottom cars with S-D Floater ball-bearing wheels. These replaced 50 wooden cars with a capacity of 1.4 tons, some of which were more than 40 yr old. The new cars and supplementary facilities went into service in September, 1950.

• **Haulage—Improvement Goals**—Goals in the latest modernization move—installation of the new cars—were economy in labor, higher efficiency in the working area and a better mine condition by eliminating spillage and dirty haulage roads and slope. On the surface, one man has been saved at the dump and a second in the preparation plant through the revision in coal-handling growing out of installation of the mine-run hopper and accompanying plant rearrangement.

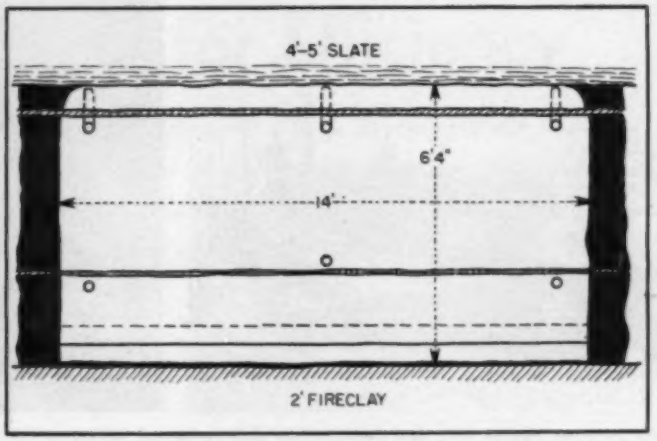
Underground, one man has been saved at the shuttle-car transfer station, or a total of three out of a previous normal working force of 25 men producing, preparing and loading 200 to 300 tons per day.

With the new cars and other facilities, the mine now is in position to materially expand production, if desired, by putting a second loading unit into service, and also is in position to do summer development with a minimum of manpower and expense — something that previously was impossible in view of the number of men required for even nominal operation of the preparation plant. Now, one man could handle development coal through the plant, whereas it previously would have required 3 or 4.

• **Track Cleaning Reduced** — An additional underground saving grows out of a sharp reduction in track cleaning. With the old cars, the entire mine crew was required for 1 to 2 shifts to clean track three to four times a season. In spite of this, the track usually was full of coal up to the car axles because of leakage out of the old wood cars and spillage off the top. Since installation of the new cars spillage and leakage have been re-

Haulage Improvements Geared to Efficient Face Cycle at Brophy Mine

UNDERCUTTING WITH A SHORTWALL equipped with a 7½-ft. bar starts the face-preparation cycle. The drill in regular service (right) is mounted on a truck and boom made at the mine.



QUALITY NUT AND STOKER is assured by cleaning in this washing unit. At the right is James R. Brophy, president, Brophy Coal Co.; left, John Hagerty, plant operator. Drawing right shows drilling for breaking 14-ft-wide room face with six carbon-dioxide cartridges.

duced to practically zero. However, track cleaning still will be done once a year as a part of normal conditioning and maintenance of the haulage roads and slope, but is not expected to require as many men when it is done.

Aside from direct savings in labor, the new cars also are expected to reduce lost time at the tipple and in loading and handling below. Since car capacity matches shuttle-car capacity and the design permits full-rate loading, stops and starts at the loading stations underground are eliminated and loading can be done at full shuttle-car discharge rate. On the surface, the cars are dumped quickly and automatically, and introduction of the mine-run hopper in the circuit permits better tipple operation.

Rated capacity of the new cars, as noted, is 4½ tons. Track gage is 36 in. Height of the cars is 38 in over the rails. The cars are handled in trips of three, and 10 are presently in service, as follows: one trip at the loading station underground; one trip on the side-track, plus one extra car for surge reserve; and one trip being hoisted and dumped. The six extra cars permit ready substitution in case one or more of those in regular use must be repaired or withdrawn from service for any other reason. In addition, the extra cars will permit adding a second loading unit when desired.

• **Bin and Crusher Added**—To accommodate the new drop-bottom cars and to permit revision of the preparation circuit, a mine-run dump hopper with a capacity of 90 tons was built of steel plate and shapes mounted on concrete footwalls. From the hopper, the mine-run product, containing lumps up to 2x3 ft in size—sometimes even larger—is fed out by a reciprocating feeder powered by an old shaker-conveyor drive.

The feeder discharges into a new Jeffrey 30x36 adjustable double-roll crusher, with the rolls set

BUGDUSTING, either by machine or hand, precedes breaking of the face with carbon dioxide.

COAL READY FOR LOADING after breaking with six carbon-dioxide cartridges. Normally, rooms are driven 14 ft wide.

12 in apart to break the lumps to approximately that size. The crusher is fitted with special manganese-steel segments and a combination of integral pyramidal and special removable hawkbill teeth. This was done to permit, if desired in the future, use of the crusher, after removal of the hawk-bill teeth, for finer crushing to increase the yield of the finer sizes, particularly stoker and slack.

For the present, the emphasis is on the coarser sizes: 6x12 lump particularly, 4x6 stove, 1¼x4 nut and ⅜x1¼ stoker, with slack a slow item, along with, at times, stoker, as a result of major competition in the industrial and commercial fields, as well as in domestic heating, from oil and natural gas.

Yield under the present preparation set-up, with mine-run crushing included in the circuit, is approximately as follows: plus 4-in, 50%; stoker, 19%; slack, 18%.

• **Truck Bin Planned**—From the crusher the coal is elevated to the main shaker screen in the tipple by a new 36-in Jeffrey belt conveyor, 55 ft long center-to-center. The screen separates the feed into lump, stove and minus 4-in. The former, after hand-picking, is loaded to box or open-top equipment. Plans now have been drawn for adding a lump bin and loading facilities for truck customers. The bin will permit truck loading of either lump or stove, or a mixture of both.

Minus 4-in, after screening to remove the fines, goes into a McNally Pittsburg washing addition (*Coal Age*, September, 1948). After washing, it is screened to nut and stoker, which are elevated to storage bins. From these bins they can be loaded separately or mixed. Both can be dustproofed during loading if desired, using the Viking system and Husky Refining Co. spray oil. Normally, stoker only is dustproofed, using approximately 3 qt per ton.

Little difficulty with freezing of the coal in transit has been experienced as a result of holding the washed coal in the storage bins over-night. Even with stoker, this prevents freezing down to zero, and even below freezing is seldom extensive enough to cause much difficulty in unloading.

• **Cleaning Results Improved**—Washing results have improved with additional experience. A recent analysis showed ash contents of 8% for nut and 8.2% for stoker, as-received basis. Btu content, moisture-free basis, last analysis, was 12,200 for nut and 12,160 for stoker.

Ash in the feed to the washer is approximately 18 to 18.5% for nut and 16.0% for stoker. Sulphur also is materially reduced—from 1.3 to 0.8% for nut, and the same for stoker. On the other sizes, the last analysis showed an ash content, as-received basis, of 6.4% for lump, with a Btu content, moisture-free, of 12,400; stove, 6.5% ash and 12.3% Btu; slack (no treatment), 11.2% ash and 11,540 Btu.

The coal is classed as medium volatile in the semi-bituminous range. Fusion temperature of the ash (stoker size) is 2,200 F. Short flame duration makes the coal especially suitable for powdered fuel for dry-process cement plants. Other industrial and commercial uses include sugar plants, dairies and canning plants. In making cheese or butter, for example, 1 lb of coal is used per pound of product. Nut is especially popular with farmers. The coal moves from Bearcreek Station over the Montana, Wyoming and Southern R. R., which feeds to the Northern Pacific. The market area extends from the West Coast as far east as the Dakotas.

• **Mining Done Up the Pitch**—Underground at the Smokeless and Spotless mine, with the coal dipping an average of 7%, the original plan of working up the pitch with shuttle cars still is proving its soundness in 6 ft 4 in of coal with a slate top 4 to 5 ft thick followed by sandstone. Cover over the present workings is approximately 200 ft. Underneath the seam is 24 in of fireclay, of which the top 4 in is hard. The fireclay will flow out from under pillars when the weight comes on in robbing.

The development plan consists of sinking three-heading slopes in the coal, with the center heading accommodating the track. Room panels then are turned to the right and left on the level or on a slight grade favoring haulage and drainage. Normally, two headings are turned off the slope, and the third is picked up through crosscuts after the barrier pillar is passed. The center heading again serves as the haulage road, with cars

handled by a locomotive. A parting is established in the mouth of each panel.

Rooms, as indicated in the accompanying plan showing the start of development in a panel, are worked up the pitch a distance of approximately 300 ft. All work is on an angle of 45 deg, except where openings are turned straight up the pitch to develop the triangular block that otherwise would be left. Normally, all places are driven 14 ft wide to leave diamond-shaped pillars about 60x65 ft in size.

Sights are set in developing rooms by means of a Brunton compass. A standard transit is used to establish the base points on the entry, after which the Brunton has been found quick, easy and completely satisfactory. Absence of track or other masses of metal that might deflect the needle is, of course, a prerequisite.

• **Pillars Mined Advancing**—Pillars normally are mined on the advance down to the stump next to the outside heading. The starting point is the top two or three pillars between Nos. 1 and 2 rooms. Pillars usually are recovered by slabbing on the side presenting the best opportunity while still putting all shuttle-car movement in solid coal as far as possible. When the pillar is slabbed down to a 4-ft fender, the unit starts work on the next pillar, with the fender as protection.

Additional protection is provided by two rows of breaker posts on 4-ft centers, with the nearest row 6 ft from the face. The breaker posts are moved up every cut and, where possible, no timber is left behind the breakers. Usually, the top breaks up through the sandstone, a distance of some 40 ft, every two or three cuts.

If the top breaks to the face or slabbing is undesirable for any other reason, the pillar is split or otherwise mined, the method depending upon the conditions encountered. Upon completion of room work, the remaining room pillars, plus the entry chain pillars, are mined on the retreat. Panel length depends upon conditions, with the management of the opinion that operation well over 2,000 ft is quite feasible.

• **Coal Pulled to Ramps** — Coal from both the rooms and from development is pulled to ramps above the center, or haulage, heading of the panel entry. These ramps are spotted about every four crosscuts. In development, the shuttle cars pull up through the crosscut ahead and down to the ramp, as indicated in the panel plan.

The top is shot at each loading station and timber ramps are installed. Height to permit the standard shuttle car to discharge directly to the mine cars is obtained by use of a built-up timber "wedge" laid on top of the timber base. These wedges are moved from ramp to ramp. Use of ramps, rather than an elevating conveyor, has been found more satisfactory and, consequently, the elevating conveyor has been diverted to handling coal on the surface. In final retreat out of a panel, the same ramps are picked up and used in turn back to the slope. With 500 ft of cable on the shuttle cars, spotting ramps as shown permits them to serve the face easily when the rooms are at maximum depth.

• **Passing Pockets Provided**—For convenience in shuttle-car routing and to eliminate the complications sometimes encountered in trying to keep cars always in separate openings, "passing pockets" are established at strategic points. These pockets have proved most helpful in pillar extraction. They are about three shuttle-car lengths long and are made by cutting back into the rib about 4 ft. A row of posts is set in the center of the space, and arranged to permit cars to operate on both sides. The shuttle-car nips are anchored at the passing pockets, reducing the possibility of interference and increasing shuttle-car travel range, if desirable.

Production underground is under the direction of Walter Sandine, mine foreman, with Lorin Newman as fireboss. Operations on the surface are handled largely by the men themselves, with general supervision by Mr. Brophy, who is assisted in the office by Joe Enrico, office manager.

• **Underground Equipment**—Equipment available for service underground, in addition to the 16 new cars and locomotive, includes the following:

1. Two 8 BU loading machines, one with a special long nose useful in working down the pitch in sinking slopes and the like.

2. Two two-wheel-drive two-wheel-steer cable-reel shuttle cars —one the original 42-E5 and the second the newer 42-E10 with elevated discharge. Both cars have 6-in sideboards, which gives them a capacity of about 4½ tons, or the same as the new mine cars.

3. Two Jeffrey 35-BB shortwall cutters with Joy shortwall trucks. One with a thin-kerf bar (5 in), is used largely in room work. Bar length is 7½ ft. The second, with standard bar and Jeffrey bugduster, is used largely in pillar work, where the extra bar thickness provides the necessary kerf opening when pressure comes on the pillars. Both machines are equipped with Bowdil chains using Bowdil throwaway bits.

4. Two post-type Dooley coal drills. The newest one is a 575 unit. Hardsocg carbide-tipped bits are used, and normally give about 2,000 ft of hole before it is necessary to touch them up on the stone. In other words, the coal is relatively easy to cut and drill. The drill in regular service is mounted on a boom placed on a truck made of an old automobile chassis and originally employed as a cutting-machine truck. The drill boom is raised and lowered by a small automobile-type hydraulic jack.

• **Breaking the Coal**—Places 14 ft wide are broken with six 231-180 Cardox cartridges placed as shown in the accompanying drilling pattern. Each place is bugdusted before breaking, either with the machine bugduster or by hand—sometimes both.

The center of the bottom row of three holes is drilled immediately over a thin series of bands about 2 ft above the bottom and is broken first to smash the bands and also a lower sulphur band up to 1 in thick. This latter band is about 12 in above the fireclay, which, with 3 in of coal left in the bottom, puts it slightly above the kerf. If there is a run of thick bottoms, incidentally, they are broken up with a Cardox cartridge, which can peel up to 100 ft in one discharge.

After the center hole is broken in the lower row, the two rib holes are discharged simultaneously to complete the job of breaking down the lower section of the seam. The top holes are then broken in similar fashion. Since the top of the seam consists of about 6 in of bony material over a series of two to three dirt bands with a total thickness of 1 to 2 in, care is taken to get the back ends of the top holes close to the roof. Otherwise, the bony tends to stick and requires considerable work to get it down.

Water is occasionally encountered in the working sections, making it difficult for the shuttle cars. If filling the ruts is not sufficient to dry it up, the mud is loaded out and the road is corduroyed.

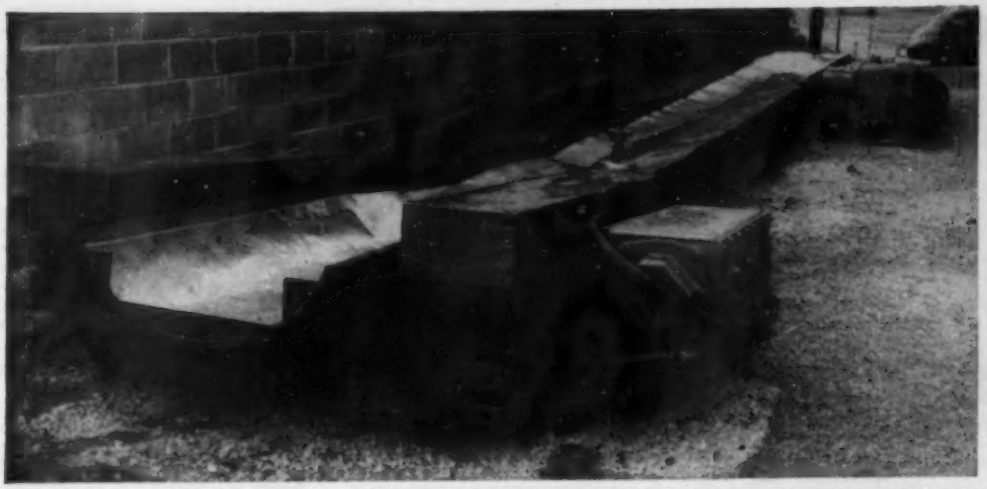


FIG. 1—CONTINUOUS ROOM CONVEYOR set up for test. In front is the crawler unit which follows the continuous-mining unit, pulling steel strip as necessary off the storage spool in the shaker-drive and storage unit at the rear.

Mining Development Committee Evolves New Unit for . . .

Continuous Conveying

Stainless-Steel Strip Used as Pan Line
Shaker Drive Includes Spool Storage of Strip
Crawler Unit Follows Continuous-Mining Machine
Continuous Service to 600 Ft Possible

CONTINUOUS ROOM CONVEYING, one of the major problems of continuous mining, appears very near a practical solution as a result of developments now nearing final underground testing by the Mining Development Committee of Bituminous Coal Research, Inc. A strip of stainless steel 1/32 in thick 36 in wide and capable of being coiled onto a small spool has been experimentally used as a shaking pan line for distances as great as 600 ft.

Three hundred feet of this metal strip can be wound in a coil as small as 20 in outside diameter. The coil or spool is mounted on slides and a shaking motion is imparted to the coil by a standard shaker drive. The free end of the coil is attached to a special set of crawlers. These crawlers pull the strip from the coil and follow the continuous-mining machine as it mines a room. Thus, simultaneous conveying and extension are achieved without interrupting the flow of coal. A short swivel-type chain conveyor feeds the coal from the continuous-mining machine onto the shaker pan, permitting the machine to turn off or make crosscuts without stopping coal flow.

With this unit, coal can be conveyed up to 300 ft at a rate in excess of 2 tpm without interrupting production to extend the conveyor. Distances as great as 600 ft are possible, but it is expected that capacity will be less at that distance. A 600-ft coil of steel strip would be about 6 in greater in diameter than a 300-ft coil.

• **Continuous-Conveyor Development**—The development of this continuous room conveyor was an outgrowth of work on the development of metal conveyor belts by the Mining Development Committee. Herman E. Smith was ap-

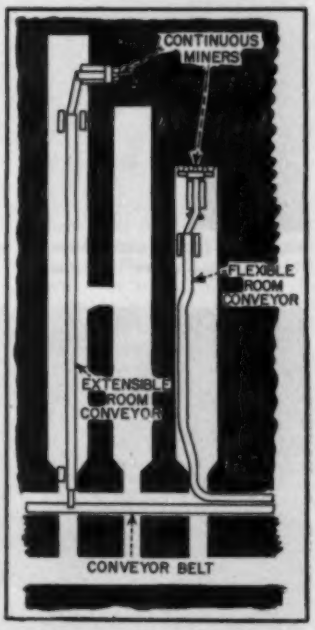


FIG. 2—TWO POTENTIAL SOLUTIONS to the problems of continuous room conveying developed in the MDC studies.

FIG. 3—EFFECTIVE FUNCTIONING of this scale-model continuous-conveying unit, using venetian-blind stock, preceded construction of the full-scale unit.

FIG. 4—PRE-TROUGHING stainless belt by bending around 12-in pipe.

FIG. 5—PERMANENT SET in stainless strip after pre-troughing.

FIG. 6—CONVEYING washed river gravel 150 ft on test unit.

pointed project engineer for continuous room conveying when the Committee approved the project in November, 1949. Mr. Smith was directed to make an abstract study of the problem of continuous room conveying for continuous mining. This study indicated that the problem had two potential solutions, as shown in Fig. 2. These are:

1. A 300-ft fixed-length conveyor able to convey around a 90-deg corner anywhere along its length.

2. A 300-ft extensible conveyor able to convey 0 to 300 ft without interrupting the flow of coal and designed so that it can be compacted into a space small enough for practical mine application.

Scale models of the 300-ft fixed-length flexible conveyor were made and studied. It was felt that this equipment could be developed faster and would use known components. The scale models indicated that a practical 300-ft flexible conveyor could be built and would be of value in many mines. However, it also was felt that practical operating conditions would preclude its application in many mines operated by subscribers to the Mining Development program.

• **Developing the Extensible Conveyor**—Earlier, during the first work on the development of metal conveyor belts by the Committee, it was felt that in view of the small space required for coils containing long lengths of metal belt, this material might be used for an extensible conveyor. It also was felt that if some means could be devised to keep the metal strip in tension in both directions, it could be used as a pan line for a shaker conveyor.

The possibilities were reviewed and the scale model shown in Fig. 3 was built, using venetian-blind stock for the pan line. This model functions very effectively, and the Committee approved the construction of the full-scale unit shown in Fig. 1. This full-scale unit, using a Goodman G-20 drive to provide the shaking motion, was set up at the Huntington (W. Va.) laboratory. Tests with the full-scale unit were conducted during the period July-November, 1950, during which time it conveyed coal over distances as great as 150 ft at rates in excess of 2 tpm.

Early full-scale tests showed the need for pre-troughing the strip. This was achieved by strapping the strip lengthwise around a 1-in-OD pipe, as shown in Fig. 4. The permanent set in the strip is shown in Fig. 5. The strip flattens when

FIG. 7—600-FT TEST CONVEYOR set up in the mine, showing crawler-tread inby-end unit designed to follow the continuous miner.

FIG. 8—CRAWLER-TREAD UNIT receiving coal from attached shaker chutes and discharging to steel-strip pan line.

FIG. 9—APPLICATION of extensible room conveyors in continuous mining.

FIG. 10—SHAKER DRIVE and belt-storage unit at outby end of conveyor.

it is wound on the spool and the troughing reappears when it is unwound, similar to the action of an ordinary extension rule. It was not practical to extend the conveyor to 300 ft at the laboratory. To simulate, to a degree, a greater length, tests were made with washed river gravel (Fig. 6).

• **Underground Tests**—When the full-scale laboratory tests were completed, the unit was taken to Jenkins (Ky.) for underground tests. At Jenkins, in an attempt to determine the maximum practical length, an additional 300-ft strip was spliced to the original 300 ft. The unit was then set up underground for the full 600 ft.

Fig. 9 shows the strip attached to the crawler-tread unit at the inby end. The strip is 36 in wide and 0.035 in thick. Fig. 10 shows the coil and drive at the outby end. As shown in Fig. 8, three sections of conventional shaker pans were attached to the inby end of the strip to pick the coal off the floor and elevate it onto the strip during the tests. The coal moved up on the pans and along the full 600 ft to the outby, or discharge, end.

• **Application Possibilities**—Several practical operating problems were revealed by the operating tests. It was felt that these could be worked out best with the laboratory-scale model. These revisions are now complete and the changes will soon be made in the full-scale unit and the field tests continued. While it will require several months to work out the refinements necessary for a commercial machine, it is not too early to consider possible use.

Fig. 9 shows a set-up with the drive unit on the entry side of the belt conveyor or mine cars and the crawler-tread unit on the room side of the belt. This system would permit the unit to be set up in advance of the room being worked by the continuous-mining machine.

In view of the probability that one of these conveyors with drive will not cost much more than a large shuttle car, it is felt that the use of three such conveyors with two continuous-mining machines would not be prohibitive from a capital-investment standpoint.

WITHOUT A WHIMPER, big diesel engine pulls 70 tons of coal out of the loading hole at Tiger mine. Torque converter applies power smoothly without straining rear end or jerking trailer.

BIGGER THAN A HOPPER CAR, tractor and trailer pull up to dump load at tipple. Chassis and frame have been widened and strengthened to support engine, torque converter and transmission.

Cutting Strip-Haulage Costs

After a Year's Trial, Big 400-Hp Diesel Shows . . .

Low Cost per Ton-Mile
Minimum Maintenance
Smooth, High-Powered Pulling

LOW OPERATING COST, smooth, high-powered pulling and reduced maintenance of tractor and trailer —these are the gains marked up by a big, new diesel engine with torque converter that hauls 70 tons of strip-mined coal from pit to preparation plant at the Tiger mine, Hume-Sinclair Coal Mining Co., Hume, Mo. Merle Guthrie, Tiger's superintendent, and Charles M. ("Scotty") Smith, chief mechanic, report that the big tractor pulls its loads anywhere on the property with ease, without trouble, without jerking and without shock to the rear end.

After 12 mo of use, haulage costs with the new engine and its torque converter over the 1½-mi road from pit to tipple and back average out at a low figure, including fuel, wages, supplies and maintenance. In that period, the tractor traveled 9,165 mi and the engine clocked 1,610 hr of running time. The engine burned 10,930 gal of fuel for an average of 0.84 mi per gallon.

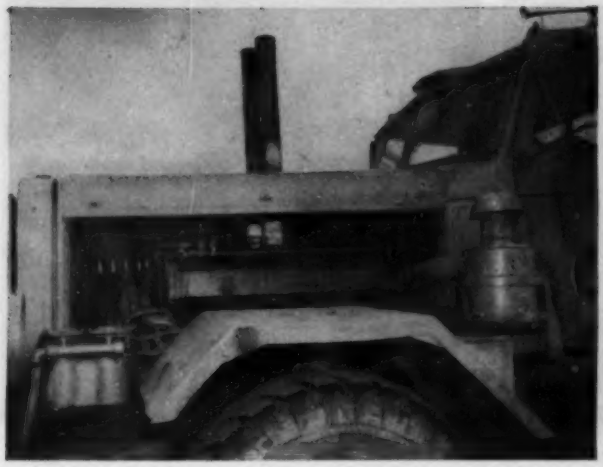
• **The new engine,** installed on a trial basis late in October, 1949, and purchased by Sinclair 12 mo later, is a Cummins NHV with 12 cylinders in V-arrangement. At 2,100 rpm it develops 400 hp. With a supercharger, which is optional equipment, the engine would develop 550 hp but Sinclair officials have found that 400 hp is enough for their haulage needs. Piston displacement is 1,486 cu. in; bore, 5⅛ in; stroke, 6 in; compression ratio, 13.5 to 1. The engine has the conventional Cummins fuel-injection system, with fuel pumps mounted in tandem.

Total engine weight is 8,600 lb. This, plus weight of the torque converter and transmission, called for extra width and strength in the tractor chassis and frame. This was taken care of by the Dart Truck Co. at their factory in Kansas City by adapting a Sinclair-owned Dart tractor and cab, formerly powered by a lighter engine, widening and strengthening from the rear of the cab forward. The engine, torque converter and transmission, now are mounted on an inner frame suspended on rubber within the main frame.

The entire tractor, clean and with empty fuel tanks, weighs 19¼

How the Big Diesel Tractor Performs

	Tractor 215, 400-Hp Diesel, 12 Cylinders, V-type, 70-Ton Semitrailer, 12-Mo Operation	Tractor 204, 275-Hp Diesel, 6 Cylinders, 30-Ton Semitrailer, 10½-Mo Operation	Tractor 117, 265-Hp Diesel, 6 Cylinders, 30-Ton Semitrailer, 8½-Mo Operation
Miles traveled	9,165	10,203	8,620
Fuel used (gallons)	10,930	4,532	3,787
Miles per gallon	0.84	2.25	2.28
Ton-miles	296,131	151,445	127,889
Hours run	1,610	1,239	1,060



ENGINE IS A V-12, developing 400 hp at 2,100 rpm. Double radiator cools engine and hydraulic fluid. Haulage cost per ton-mile is low. Heavy engine plus torque converter and transmission required extra frame strength.

HYDRAULIC STEERING is easy. Steering-post lever brakes trailer. Floor levers control transmission and forward-backing movement.

tons. With such heavy weight, 14.00x24 tires are used instead of the 12.00x24's on lighter trucks, and Vickers hydraulic steering has been installed to provide finger-tip control. The tractor is equipped with tandem rear axles.

In spite of the heavy weight of the tractor plus its 70-ton capacity semitrailer, no changes have been needed in Sinclair's road-building methods. All haulage roads are built with a sub-base of 3 ft of shale, graded and compacted, and a 6-in topping of crushed rock. A road-maintenance crew is on constant patrol.

• **The torque converter,** installed behind the engine at the Cummins factory, is a Twin-Disc Model F, Series 11,500. Acting as an automatic transmission, it instantly and automatically selects the proper torque ratio in terms of the load to be pulled and the power the engine delivers, and thus takes driver guesswork out of operations. The torque ratio can be increased up to 5 to 1, where the converter stalls.

The torque converter has only four major components, as follows:

1. Pump, or impeller—One set of blades driven by the engine. This circulates the hydraulic fluid into and through the turbine.

2. Turbine, or runner — Three sets of blades that absorb the power from the fluid. The turbine is connected to the output shaft driving the load. The first two sets of blades are fixed but the third set varies in length and shape with the torque and speed required.

3. Stationary turbine, or stator —Two sets of guide, or reaction, blades contained within the turbine housing.

4. Hydraulic fluid—Total of 9½ gal in the system. The converter is equipped with reserve fluid tanks and an auxiliary pump.

Input shaft and impeller bearings are lubricated by splash or spray; turbine wheel and output shaft, by a grease fitting. Lubricating and hydraulic fluids are changed every 1,000 hr or every 3 mo; turbine-wheel and output-shaft bearings are greased every 200 hr or every 2 wk.

Normal operating temperature of the torque converter is 160 to 220 deg F. Maximum safe continuous-duty temperature is 250 deg F. For cooling the oil, which is necessary when there is little or no load, an additional radiator is mounted in front of the regular engine radiator. The converter operates most efficiently when output-shaft speed is half of input-shaft speed.

• **A fluid-drive transmission,** Twin-Disc, is mounted behind the torque converter. The transmission has two speed ranges: low, up to 8 mph; high, up to 22 mph. Gears may be changed at full throttle but because grades at the Tiger mine are gentle and roads are good, the tractor nearly always operates in high, even when pulling out of the pit with a load. Because the engine was built originally for railroad-yard switching service, the transmission has 100% reverse speed. But high-speed reverse is unnecessary in a tractor, and Sinclair officials are considering installation of a 5-speed transmission to replace the present 2-speed transmission.

The first general overhaul of the big Cummins diesel, with torque converter and transmission, took place in October, 1950. Overhaul and replacement of parts, a joint project of Cummins and Sinclair, took less than 100 man-hours and cost approximately $750.

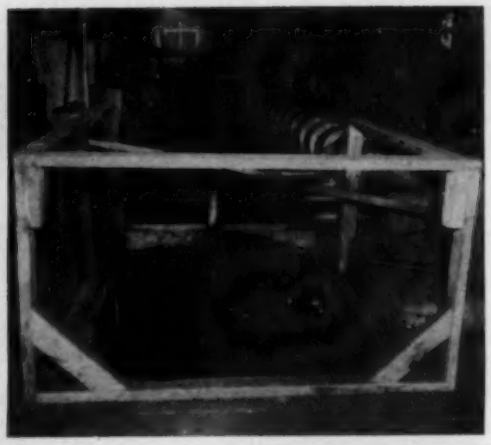
Fourteen tractors and 13 semitrailers comprise the entire haulage fleet at the Tiger mine, as follows:

Seven semitrailers, 65 to 70 tons capacity, pulled by 6 butane tractors and the 400-hp diesel.

One semitrailer, 35 tons capacity, pulled by a lighter diesel or butane tractor.

Five semitrailers, 30 tons capacity, pulled by 265 to 275-hp diesels.

The 30-ton semitrailers are used in the Sprague pit, some 10 mi from the Tiger preparation plant, to haul coal about 2 mi from the pit to a transfer point. At the transfer point, the coal is dumped into a hopper, crushed and loaded into railroad hopper cars for the 8-mi haul to the tipple. The preparation-plant hopper recently was rebuilt to permit semitrailers from a nearby pit to dump on one side and railroad cars on the other. A Robins Meyers car shakeout is installed on a heavy steel framework above the railroad track.



FEEDER delivers to shaking screen-picking table. Jig plates control refuse beds. Screw removes hutch material.

New Features in Tennessee Plant Result in . . .

Lower Cost — Monitors Haul Clean Coal Only

Efficient Jigging — Plates Control Refuse Beds

Good Dewatering—High-Speed Vibrators

Water Saving — Settling Tank Clears Water Fast

HIGH UP ON A MOUNTAIN, Wind Rock plant is tight-built and efficient.

Mountaintop Coal Cleaning

By W. F. DEADERICK, Preparation Superintendent
Wind Rock Coal & Coke Co., Wind Rock, Tenn.

And MACK E. HAWORTH
Haworth Engineering & Mfg. Co., Birmingham, Ala.

SUPPOSE YOU RUN A MINE near a mountaintop, like the one Wind Rock Coal & Coke Co. operates at Wind Rock, Tenn., in Anderson County.

Your first thought would be to build a preparation plant in the valley below. That way, you could drop raw coal down the mountainside in monitors and clean it in the valley. You'd have plenty of room to build your plant and plenty of water to operate your jigs and settling tanks. And you could pile up the refuse close by.

But officials at Wind Rock didn't see it that way. To begin with, refuse in the raw coal was high and they figured that a big part of their haulage dollars would go toward dropping bone and other refuse, together with coal, down to the plant in the valley. A monitor system is a production bottleneck anyhow, and the more refuse you haul, the less coal you can haul. Besides, the men at Wind Rock liked the look of the valley and didn't want to spoil it with a refuse dump.

That's why Wind Rock officials

HIGH-SPEED VIBRATORS dewater 4x0 at 60 to 65 tph per cell. Single-deck slurry vibrator (right) handles 15 tph.

SETTLING TANK releases water and slurry near bottom. Water clears quickly.

hung the preparation plant on the steep mountainside, near the mine mouth at the top. They built it tight and compact, so it wouldn't take much room. They pumped water up from the valley and built a closed-circuit water system into the plant to keep pumping costs down. And they installed new-type high-efficiency equipment, with a jig of new design, super-speed long-stroke vibrating screens and shorter spacing between cells. The result is that they spend nothing to haul refuse down the mountain. The only thing that goes down to the loading tipple below is clean coal, ready for shipment.

The coal now mined at Wind Rock is known locally as the Upper Dean seam but geologists call it the Big Mary seam. It averages close to 60 in thick. Over portions of the mine, the coal carries some high-ash bone, most of which can be taken out by washing. In other sections, a high-ash rash occurs. This rash has about the same density as the coal and cannot be removed except by hand-picking. It is not extensive, however, and when mixed with the coal does not greatly alter the ash content of the shipped product.

The mine mouth is about 2,400 ft above sea level and about 1,500 ft above the loading tipple and railroad sidings, which are a little above the foot of the mountain. Monitors, 14 tons in capacity, drop the cleaned coal down the mountainside, traveling some 4,250 ft along the slope. Maximum trips per hour is 15. Normally, the system makes 12 to 14 trips per hour.

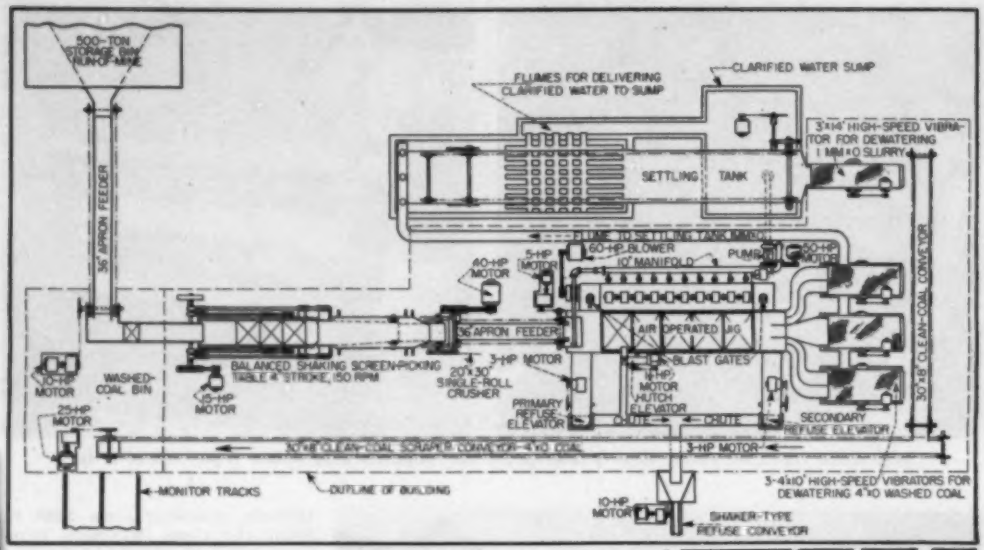
• **Water Supply**—During the fall months, when water is scarce and must be conserved, washery water is provided from a 250-ft-deep well at the foot of the mountain. This water is delivered to a nearby surge tank and from there is pumped by a duplex pump through a 3-in line to storage tanks built above the washery. The pump works against pressure of 600 lb.

• **Raw-Coal Handling**—Coal from the mine is stored in a 500-ton bin. In the morning, night coal stored in the bin keeps the washery operating until the day coal begins to arrive at the plant. This system permits the mine to operate two shifts and the washer to operate on the day shift only.

Run-of-mine coal is delivered to the combination shaking screen and picking table by a 36-in wide Link-Belt apron-type feeder conveyor. The speed of the conveyor and the depth of the coal on the conveyor, which is provided with skirt plates 24 in deep, regulate the rate of feed. At present, the conveyor operates at 35 fpm and the depth of coal averages 18 in, thus providing space for the large lumps.

The upper end of the balanced shaker is fitted with 36 sq ft of 3-in round perforated plate for removing the 3x0-in for delivery to the jig-feed conveyor. This size totals about 75% of the run-of-mine output. The 3-in lump passes over the picking-table section, which is the lower end of the

Wind Rock Flowsheet Reflects Efficient Cleaning in Small Space



shaker. The lump rolls from the end of the picking table into a Pennsylvania 20x30-in single-roll crusher, which reduces the lump to about 4 or 4½x0. The crusher, located over the jig-feed conveyor, drops the crushed product onto the 3x0 from the shaker.

No hand-picking is done at present and the large refuse simply passes through the crusher with the lump coal. This is because there now is no market for this particular lump coal. At some future time, however, another seam will be mined. That seam will produce a lump coal for which there is a market. At that time, the lump can be hand-picked and by-passed directly to the clean-coal conveyor.

The jig-feed conveyor is carefully designed for straight-line feed into the jig. This arrangement prevents segregation of the fine and coarse sizes and distributes all sizes uniformly across the conveyor's width. Segregation and uneven distribution would interfere with water distribution in the jigging process.

• **Washing the Coal**—The jig is a newly designed two-compartment 10-cell air-operated structure, 5 ft wide by 20 ft long, designed and built by Haworth Engineering & Mfg. Co. The primary compartment comprises four cells; the secondary compartment, six cells. The cells are 2 ft wide. The 10 rotary air valves are driven by a 3-hp gear motor.

The refuse draws are reciprocating plate feeders, motor-driven from eccentric shafts. Each draw is driven by a 3-hp motor. The screen plates are adjustable over each two cells, the primary compartment being provided with two screen plates and the secondary compartment with three. These provide adequate control over the refuse beds.

A screw conveyor, extending the full length of the jig and located outside the jig, removes the hutch material. A separate elevator lifts the hutch material for disposal with the refuse or for re-treatment to recover coal contained in the hutch. Although the hutch material averages 65 to 70% ash, it contains enough coal to warrant recovery.

A positive-displacement Root-Connersville blower provides air for the jig, the primary compartment being operated at 3½ lb pressure and the secondary compartment at 2½ lb. The Goyne water-circulating pump has an abrasion-resisting casing and impeller. The shaft is chromium plated.

The variable-speed refuse draws have wide speed regulations and their operation is unusual. The eccentric shafts are driven by Westinghouse series-wound dc motors from power generated by series-wound mg sets furnished with the jig. The mg sets are standard Westinghouse units with dc series-wound motors driven by squirrel-cage motors. The generators are provided with resistance in shunt with the series fields. As resistance is cut in or out, the current through the field is increased or decreased, thus raising or lowering the generated voltage. Since the speed of a series-wound motor changes with the impressed voltage, the refuse-draw motors speed up and slow down as the resistance in shunt with the generator field is altered.

The equipment for the variable-speed system is standard. The resistance banks are cut in or cut out by Westinghouse contactors operated by mercury switches, which serve as push buttons. The mercury switches are actuated by the refuse floats. As the refuse beds rise or become deeper, the floats operate the mercury switches to increase the speeds of the draws. The speed range is about 10 to 1 but can be adjusted to any desired value between 4 to 1 and 10 to 1.

• **Dewatering the Coal**—The three dewatering screens for the washed coal from the jig are 4x10-ft double-deck high-speed vibrating units, manufactured by Productive Equipment Corp., with ⅜-in square mesh on the top decks. The bottom decks are partly 1 mm and partly ½ mm Bixby-Zimmer drainage screens. The major part of the coal passes over the top decks. The three screens installed handle 60 to 65 tph each.

The 1mmx0 slurry recovered from the settling tank is dewatered on one 3x14-ft single-deck vibrator fitted with ¼-mm drainage screen. This vibrator handles

about 15 tph. It is a productive Equipment Corp. Gyroset unit similar to the coal dewatering vibrators.

All screens are suspended on wire rope and cushioned with rubber shock absorbers. Operating speed is 1,200 rpm. The three 4x10-ft units are operated at 5/16-in strokes and the 3x14-ft unit at 3/8-in strokes. Strokes of all vibrators are adjustable by means of eccentrics installed in the screen-drive assemblies. Each screen is driven by a 5-hp 1,750-rpm motor.

• **Settling-Tank Operation**—The Haworth settling tank is a newly designed unit that reverses the flow of water from that in the usual design. The water and slurry are released near the bottom of the tank and the water is forced to rise upwardly at slow velocity. The clarified water overflows into a series of flumes provided at the surface. To prevent a heavy weir pull, the number of flumes is adjusted to provide the length of weirs required to limit the depth of water flowing over the weirs to ½ in or less.

The size of the settling tank is adjusted to provide long retention periods. Likewise, the top area of the tank is adjusted to develop low upward-rising water velocity. This combination results in effective settling of the fines and in clarified water with a low percentage of solids. With the circulating water kept in a closed circuit, there is no loss of water or solids.

The settling tank is provided with a Link-Belt flight drag conveyor for removing the solids. The speed of the conveyor, driven through a gear reducer and chain drive from a 3-hp motor, is very slow. The solids are discharged from the conveyor at about 35% moisture. They fall directly onto the slurry vibrator, which reduces the moisture to about 22%. The slurry, forming a bed about 3 in thick on the vibrator, is discharged in cakes that appear dry as they leave the end of the vibrator. The filter cake does not contain any free water.

The drainage water, containing only very few solids, returns to the settling tank. The extreme finer sizes trapped in the slurry bed are discharged at the end of the vibrator. The slurry bed appears to act as a filter, trapping the finer particles rather than permitting them to pass through the drainage screen.

• **Disposing of Refuse**—Refuse from the two jig elevators is delivered by chute to a small surge hopper and automatically fed onto a shaker-type conveyor that was available from mining operations. This shaker discharges the refuse over the mountainside. The drive end of the conveyor is mounted on a concrete pad at the surge hopper. A 10-hp motor drives the conveyor. Pan sections 10 ft long are added to the conveyor as required.

Thus refuse disposal is substantially automatic and no attention is needed except when pan sections are added. The conveyor is pitched slightly downhill. Capacity is adequate for handling the washery refuse, which averages from 10 to 12% of the raw feed.

• **Plant Performance**—When the plant first was started, the washed-coal rate—210 to 215 tph—was slightly in excess of the clean coal produced at the mine-production rate—235 tph. Thus there were frequent shutdowns of the plant while waiting for coal. The feed rate now has been slowed down to about 200 tph, or somewhat less, and the clean-coal rate to about 175 tph.

The washed run-of-mine leaves the washery at 3 to 3.5% surface moisture but moisture at destination is somewhat less because of evaporation and handling. There is no substantial drainage from the washed-coal bin or the monitors and none at all from the railroad cars. This effective dewatering is attributed to the speed and stroke of the vibrators, which operate at a minimum of 1,200 rpm and 5/16-in stroke. All the screens are mounted level. No doubt, moisture retained in the washed coal could be reduced further if the load on each screen were cut down and the screens tilted uphill, but the additional cost would not be warranted. The coal is sold principally as steam coal.

The clean-coal ash is held to within 1 to 1.5% of the inherent ash at 1.50 sp gr. This is satisfactory for the users. There are several factors that must be taken into account and only tests by the users can be taken as a guide to the jig's operating performance. By adjusting the water and the differential strokes of the air valves, certain bone coal can be included in the clean-coal products or placed in the refuse. Economical operation requires the maximum yields of washed coal, but though the coal is normally a free-burning coal, the bone contains as much as 15 to 20% ash and is not free burning. Most of the bone now is being discarded with the refuse because of its poor burning characteristics.

In addition to the bone coal, considerable coal of egg size reports to the refuse. When broken open, however, this coal is found to contain balls or bands of pyrite. A study at some later date will be needed to determine whether the cost of crushing and retreating will be warranted.

The minus 10-meshx0 raw coal contains an average of 22 to 25% or more of ash. The slurry recovered from the settling tank averages 17 to 18% ash. That is about as good as can be expected from a jig working at such a high rate of capacity. If market conditions should demand it, the slurry could be by-passed through a flotation machine and reduced to about 7.5 to 8% ash. This would reduce the ash in the 4x0 about 0.5% but it is not likely that the additional cleaning-plant cost could be added to the sales price. Therefore, though the washery was designed for the future installation of flotation, the additional expense will be deferred for the present because the coal cannot be placed in other than steam and domestic markets.

• **Power and Manpower**—The total connected load of the Wind Rock plant is 262 hp. With an actual load of 205 hp, the load factor is 78%. The total load on the bank of three Westinghouse 75-kva transformers is 169 kw, indicating a total consumption of about 1 kw-hr per ton of washed coal, including lighting and all losses.

Two men comprise the normal operating crew—one jig operator and one electrician. These men are supplemented occasionally on off shifts for general maintenance of the plant, adjusting conveyor take-ups, extending the refuse-conveyor pans and the like. Though maintenance work is a minor item at present, off days are available when the plant is not working full time.

The Wind Rock plant was partly constructed by the coal company, with the supervision of Mack E. Haworth. Later, Haworth Engineering & Mfg. Co., Birmingham, Ala., took over construction and completed the job. The Haworth organization manufactured and provided the jig, conveyor frames and steel, the under-cut bin gates, the settling tank, the wiring and lighting and the plant design and detail.

Photos by Fraley, Christopher Coal Co.

1 ROOF PROBLEM—scaling as a result of air slacking. This view in Brock No. 4 mine shows scaled material gobbed along the ribs of the main haulway. Continued crumbling of the top presented a major problem.

Sealing Roof and Stoppings

Material—Plastic Film Applied With Spray Gun

Applications—Protecting Roof on Haulage Road and Sealing Stoppings and Overcasts

Results—Low-Cost Elimination of Scaling Problem and Major Reduction in Air Losses

By F. R. ZACHAR

General Superintendent, Christopher Coal Co., Division of Pittsburgh Consolidation Coal Co., Pursglove, W. Va.

A RATHER NEW METHOD is being used by the Christopher Coal Co., Pursglove, W. Va., for the solution of two heretofore difficult problems.

1. Protecting exposed roof on haulroads against air slacking.

2. Cheaply and effectively sealing leaky stoppings.

The method is spray application of a plastic film, used in both Brock No. 4 and Arkwright No. 1 mines.

Brock No. 4 mine is in the 70-in Sewickley seam, which has a dense laminated shale roof directly over the coal. The coal is shot from this roof, which is very hard and stands well without timber in most areas. The main haulage road serving the mine is nearly 7 mi long from the sections to the tipple and is on intake air. Exposure to air, particularly to humid summer air, causes slacking or crumbling of the exposed roof. Scaling of this loose material over the haulway has been very costly and rather ineffective inasmuch as it is a never-ending job. Areas scaled and made safe this month will need rescaling next month. Scaled material gobbed along the main haulway is shown in Photo 1.

Sealing Roof

To eliminate the scaling cost and to permanently protect scaled areas in Brock No. 4, the mine management has elected to use a sprayed plastic known as "Cocoon." Cocoon is a liquid which, when sprayed under pressure, deposits in a quick-drying film of such density that it seals against both air and moisture.

The application of this sealing compound is quite simple and not at all costly. At Brock one man has been assigned to the job of spraying the roof on the main line. The equipment consists of a compressor driven by a 1-hp 250-v dc motor and capable of delivering about 30 to 40 cfm at 40 psi; a two-compartment spraying tank di-

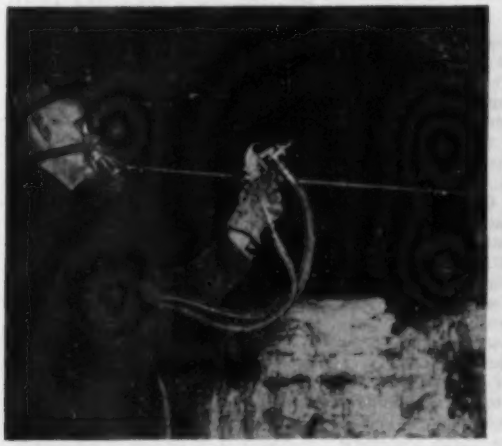
2 ANSWER—sealing with plastic film. In this illustration, roof has been primed and the plastic film is being applied. The equipment is mounted on a light push truck for moving and is set in crosscut for spraying on the main line on work days.

vided to hold 1 gal of Pli-O-Bond primer and 4 gal of Cocoon; two spray guns; and the necessary hoses.

The total investment in equipment is $405. Photo 2 shows the equipment mounted on a light push truck for easy moving. This photo also shows the rubber-tired wheels on the compressor for ease in moving where no track exists. In this illustration the roof has been primed and the operator is beginning to apply Cocoon.

• **How Roof-Sealing Is Done**—In applying the sealing compound, the man first scales about 300 sq ft of roof, taking down loose material and brushing the top relatively free of excessive rock dust. Scaling of ribs is done to only 6 or 8 in below the roof. It has been found practical to scale only that portion of roof that will be sprayed on that particular day.

A strip of roof about 8 ft wide



3 FILM APPLICATION, showing extent of scaling on the coal ribs. A priming coat is first applied as a base for the film.

4 ROOF SEALING IN PROGRESS, with Superintendent J. N. Gartley and Mine Foreman J. L. Davis inspecting the job.

5 STOPPING SEALED with plastic film to reduce leakage in Arkwright No. 1 mine being checked by State Mine Inspector George Benson, Mine Foreman C. L. Burnside and Safety Engineer R. P. Mulligan. Some 210 stoppings and two overcasts were sealed.

6 SIDE WALL AND TOP of sealed overcast in Arkwright No. 1, part of a sealing job that cut air loss 17,000 cfm.

is then sprayed with Pli-O-Bond primer using the primer spray gun. Experience teaches the operator the proper primer thickness. Then this gun is set aside and a second gun is used to spray Cocoon over this primed area. The usage ratio is 1 gal of Pli-O-Bond to 4 gal of Cocoon. So that the operator may better follow the progess and density of his application, we are using a red dye in the Cocoon.

Photo 3 shows the operator applying Cocoon. This photo also shows the extent of scaling on the coal ribs. Photo 4 shows Superintendent J. N. Gartley and Mine Foreman J. L. Davis inspecting the sprayed roof. As shown in Photo 1, the truck carrying the compressor and spray tank is set off the track in a crosscut while spraying on the main line on work days, and the passage of main-line trips causes very little delay in spraying. The ability to do continuous roof sealing on the main line gives this method considerable advantage over others.

• **Roof-Sealing Cost**—Total cost of labor and material on the 15,000 sq ft of roof sealed to date has been $0.130 per sq ft. The management feels that this cost is well under that of other methods investigated. Also, the low investment cost, $405, is well under that required for other methods.

The Cocoon is delivered in 55-gal drums and the Pli-O-Bond in either 5- or 55-gal drums. It has been found that these materials must be stored at temperatures above 40 F, as they tend to become stringy at lower temperatures. It also has been found that the material can be more economically handled in the mine by using 5-gal cans. Acetone must be used to clean the equipment after each shift to prevent clogging.

Brock mine also tried spraying canvas stoppings to eliminate their replacement with concrete block for permanent installations. This was very successful in preventing air leakage but, since the places were bottom cut, the overhanging coal — a natural occurrence in such places — tended to fall, destroying the effectiveness of the stopping corners.

Sealing Stoppings

At Arkwright No. 1 mine, which operates in the Pittsburgh seam, the management has sprayed 210 permanent block-stoppings and two permanent overcasts. Prior to sealing with Cocoon, an air-intake loss of 37,000 cfm was incurred over its 10,000-ft course. After sealing the stoppings and overcasts the leakage loss was reduced to 20,000 cfm, a net saving of 17,000 cfm of useful air. The pressure differential over the distance was about 1 in water gage.

The equipment used for this work was the same as that previously described. However, a two-man crew was used for maximum efficiency. One man was kept busy cleaning and scaling loose material at the stopping edges, brushing loose rock dust off the stoppings and moving the equipment ahead. The gun man was kept busy spraying. Here again, the Pli-O-Bond primer is applied first, followed by the Cocoon.

Large cracks and crevices were readily covered and sealed by increasing the thickness of the Cocoon layer. Where cracks or openings were too large to web over with film, a piece of cheesecloth was primed with Pli-O-Bond and placed over the hole. Then the Cocoon was readily applied and the opening sealed. Inspection after 4 mo has revealed no loosening of the coating or leakage of air in the stoppings and overcasts sealed.

A normal stopping, 6½x16 ft, required ½ gal of primer and 2 gal of Cocoon. Two men sealed, cleaned and sealed an average of four normal stoppings per shift.

Photo 5 shows a sealed stopping, Photo 6 a side wall and top of a sealed overcast.

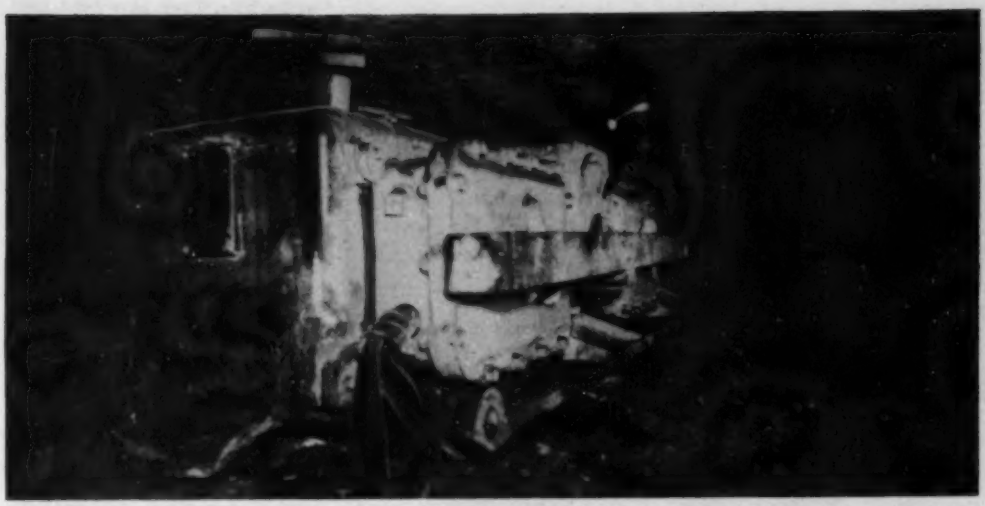


FIG. 1—MINE POWER CENTER on the job in a low-coal mine. Advantages include compactness, portability and fire- and explosion-proof operation, in addition to ability to operate close to the face and thereby reduce voltage loss in low-voltage cable runs.

Modernizing Service to Face Units With . . .

Mine Power Centers

Problem—Maintaining Voltage to Equipment at the Face
Solution—Modern Mine Power Centers
Advantages—Higher Voltage, Portability and Safety

By HENRY S. GATES
Transformer Design Engineer, Westinghouse Electric Corp., Sharon, Pa.

MODERN METHODS of electric-power distribution in mines using dry-type power-center transformers will maintain proper voltage to keep electric-powered equipment operating at high efficiency even at the farthest working face. Fluctuating voltage—sometimes as much as 30% or more—cuts efficiency, increases maintenance and causes frequent outages. Improved methods of AC electric-power distribution developed for factories and industrial plants during the last few years can cut operating costs in mines and keep electric-powered machinery operating at peak efficiency.

• **Mine Problem**—The problem in mines is the long runs from the source of power to the machines at the working faces. If DC is used, it must be generated at the voltage used by the machines. Since a fixed amount of power is required by any machine at full load and because low operating voltages are necessary for safety, the current must be high to provide this power. Voltage drop, with its resulting poor machine operation, is in direct ratio to the amount of current flowing. Also, wasted power in the form of heat loss always accompanies the transmittal of an electric current along a cable and this loss increases in proportion to the square of the current flowing.

With a fixed load, if the voltage can be increased, the current in amperes will be reduced since power is the product of current and voltage. Thus, if the voltage was doubled, the current flowing along the cable and the voltage drop at the machines would be only half what they were. Doubling the voltage also has an added effect, because the smaller voltage drop subtracts from the increased supply voltage, and thus the voltage drop at the machines is cut, in percent, to one-quarter what it was. Heating losses in the lines also are reduced greatly.

• **High Voltage the Solution**—The solution is to transmit electric power at high voltage as far as possible and permissible into the mine before reducing the voltage to that required by the machines. This can be done efficiently only with AC current since DC requires rotating machines or rectifiers for such voltage changes, with attendant moving and installation problems. High-voltage lines can be run as shown in Fig. 2 to some convenient spot as near the working faces as permissible where a transformer is located to reduce the voltage to that required by the machines. Thus, low-voltage runs with their high currents are kept short and voltage drop is reduced to a minimum.

Portable power centers, such as shown in Fig. 3, are now avail-

How Modern Mine Power Centers Promote Efficiency in Power Service

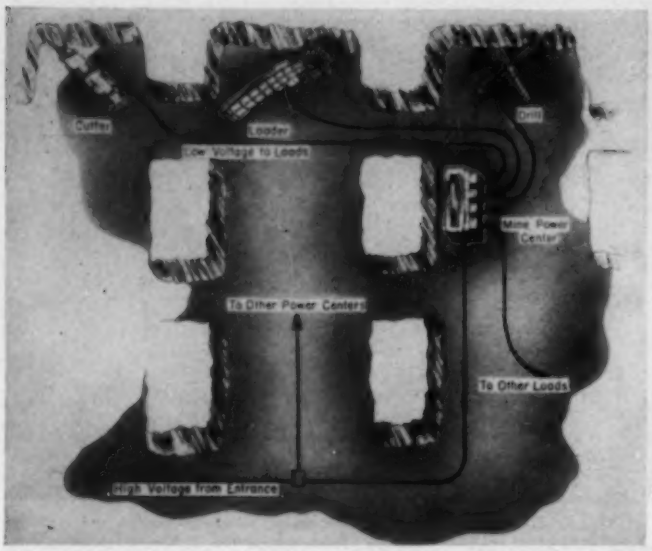


FIG. 2—EXTENDING HIGH-VOLTAGE CIRCUITS to power centers near the working faces keeps voltage drop to a minimum and increases machine efficiency.

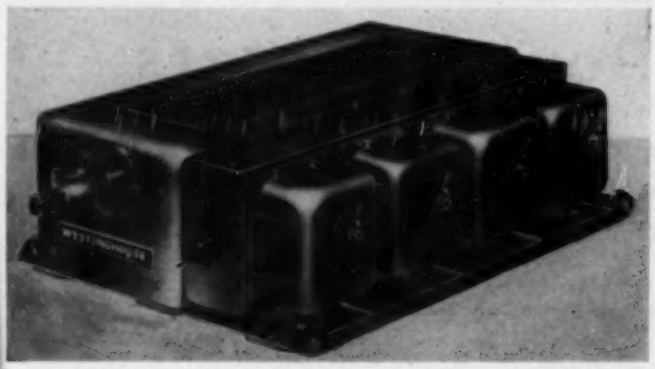


FIG. 3—MINE POWER CENTER is compact, portable and fire- and explosion-proof.

able. They include a transformer and the necessary accessories designed especially for this type of service in mines. These units are constructed as simply as possible for maximum safety, ease of installation and operation. Height is considered a limiting feature. Ratings of 75, 112½ and 150 kva, three phase, 2,400 or 4,160 on the high-voltage side, are built to an over-all height of 25¼ in. The 200-kva unit, and some sizes rated at 7,200 v, are 34 in high. Plan dimensions are approximately 44 x86 in and weights range from 2,000 to 4,000 lb.

These transformers contain no oil or other insulating liquids. Thus the weight is reduced and the possibility of fire is avoided. They are sealed to operate in an inert atmosphere of nitrogen. Their cases will withstand submersion in water for indefinite periods of time, as well as all operating pressures resulting from temperature. Little or no ventilation is required.

These transformers can be skidded on built-in skid plates to suitable locations and left with no attention to foundations or leveling. Sealed dry-type power centers and their accessories have been approved by the state department of mines in Pennsylvania and Colorado, and by other authorities. They have been used successfully in mines in Kentucky, Utah and other states and countries.

• **Power—Center Construction**—Power centers for use in mines require special construction if they are to be efficient in such service. In addition to being low in height, they must be compact while still being able to handle temporary overloads. Motors on mining machines usually are required to run 15 min or so and then are off for 15 to 30 min. Thus, while the transformer windings may develop relatively high temperatures during short overload periods, there is an opportunity for the transformer to dissipate this heat to the outside air during the off periods.

Insulation for these dry-type transformers is made up of Class H high-temperature materials, such as: porcelain, glass and mica bonded with a silicone or similar varnish. Assembly of such a transformer is shown in Fig. 4. Temperatures in the windings may reach 225 to 240 C during short-time overloads or, at rated load, remain continuously at approximately 180 C without injury to the insulation.

Satisfactory service is reported for a 150-kva unit with a connected load of 600 kva and operating with the usual working-face diversity of load. The transformer case remained very cool during this operation. Such large variations between the size of the transformer and the connected load are not desirable where mining operations are relatively continuous since, without off-periods, the transformer would not cool satisfactorily.

Since sealed dry-type mine power centers are lighter in weight than the equivalent liquid-immersed ratings, transportation is facilitated and larger capacities become possible within the space limitations required for mining applications. For instance, dry-type 150-kva mine power centers for a West Virginia mine weigh, with high-voltage and three low-voltage connections, 2,600 lb. Had this unit been of the submersible type, its weight would have been increased approximately 25%, or to nearly double the weight of the sealed dry-type unit using high-temperature Class H insulation.

• **Power - Center Accessories** — Mine power centers require special accessories for safe and easy operation. Air circuit breakers

are provided on the low-voltage side to disconnect each circuit if faults or excessive overloads occur in either the cables or in the connected equipment. These breakers operate very quickly with short circuits or excessive loads but, at the same time, the breakers must also have sufficient capacity to carry safely all requirements of normal operation.

Air circuit breakers used with the mine power center are manually operated but open automatically to clear high overloads and short circuits. They are shown in Fig. 5. Instantaneous magnetic trips operate the breakers within 1/20 to 1/30 sec. The breakers can be reset readily to return power to motors and lights after the trouble has been removed. They are available in 100-, 225- and 600-amp continuous ratings and will safely interrupt fault currents from 15,000 to 25,000 amp.

Cable attachments to the mine power center are designed especially for this service. High-voltage connections are made by a flexible three-conductor cable terminating in a polarized plug-and-receptacle pothead. When a power center is moved from one location to another, the high-voltage feeder should be deenergized at the supply sub-station and then the feeder plug pulled from its receptacle at the power center and capped until the unit is to be returned to service. Additional cables equipped with similar fittings can be used to extend a feeder.

Low-voltage cables are attached to the wiring compartment of the power center by approved-type male-and-female polarized safety connectors. There are three main contacts for power, plus a fourth contact for the ground wire and a two-conductor control circuit that trips the breaker in the event the coupling is broken while carrying power.

This is an important safety precaution. Heavy currents will not be broken accidentally at the coupling by a wireman when extensions are being made as mining equipment is moved forward or as the transformer is shifted to a point nearer the working faces. Also, if anything damages the power cable, breaking the control-wire circuit, the power shuts off before damage is done.

The control-wire contacts break connection in the receptacle before the main power contacts open. Thus the circuit breaker operates instantly, making it impossible to draw an arc before the plug is fully disconnected. The circuit breakers also will trip instantly when current leakage to ground, as a result of insulation failure in machines or cable conductors, reaches dangerous proportions.

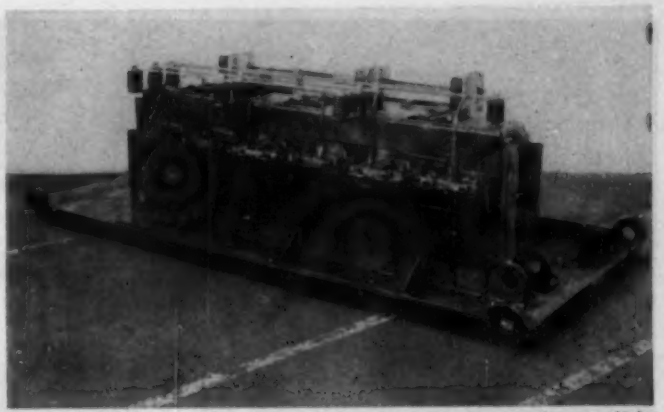


FIG. 4—WEIGHT IS SAVED and fire and explosion hazards eliminated by using high-temperature Class H insulating materials. All liquids are eliminated.

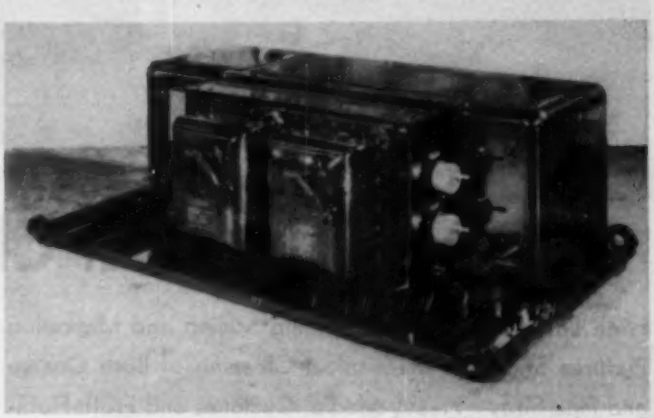
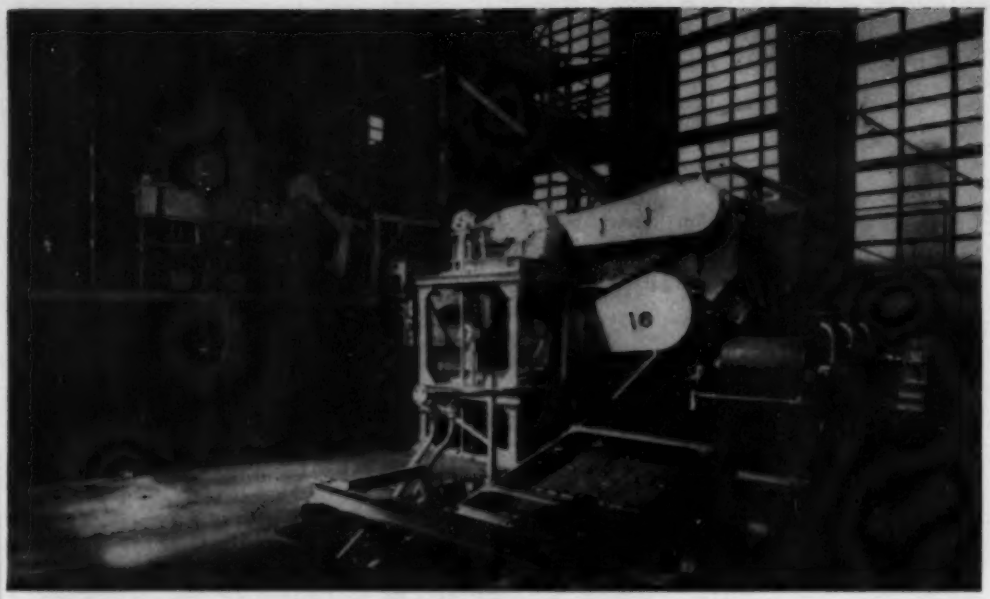


FIG. 5—CIRCUIT BREAKERS within the two explosion-proof housings instantly cut off any low-voltage circuit that develops trouble, leaving the others operating.

• **Design Prevents Fire and Sparks**—Atmospheres in mines may at times become explosive. Thus it is necessary that electrical equipment used be designed so that it will not produce open sparks. In the mine power center, the transformer itself is built of non-flammable material and then is hermetically sealed in a steel case filled with inert nitrogen. The low-voltage circuit breakers are housed in aluminum - alloy explosionproof enclosures approved by the Bureau of Mines. High-voltage taps are omitted to assure a simple mine unit, completely sealed.

Voltage regulation is obtained by bringing out a low-voltage tap through a solder-sealed bushing to a wiring compartment. Roughly, 5% additional voltage can be obtained by changing connections from one terminal to another in power centers for 230 and 460 v.

Sealed dry-type power centers provide mines with the advantages of the efficient methods of power distribution found in modern factories. These units are compact and designed to fill the needs of mine service with the highest degree of safety. They are very efficient and easily operated. Maintenance is held to a minimum because these power-center transformers are devoid of all liquids and are hermetically sealed against dust, dampness and explosive gases.



HOLLAND-DEVELOPED HEAVY-MEDIUM WASHERY in north France. The process is scheduled for early use in the United States.

Trends in Coal Cleaning

High Labor Costs and Changing Mining and Marketing Pictures Stimulate Mechanical Cleaning of Both Coarse and Fine Sizes—Heavy-Media, Cyclones and Froth-Flotation Units Expand Cleaning Possibilities

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PRESENT TRENDS in bituminous coal cleaning are primarily the result of increasingly high wage rates and the fact that much of the highest quality bituminous coal already has been mined.

The impact of high wage rates has been greatest on underground costs and has led to increasing use of mechanical-mining methods to offset the effects of the ever-increasing rates. The use of loading machines underground has made it more difficult to eliminate impurities, and experience seems to indicate that the cheapest mechanical-loading costs can often be obtained by shooting considerable roof material, bands or partings in the seam, and even bottom material, with the coal.

These new mining methods, in addition to adding heavy refuse materials which can be removed from the coal fairly easily, often add materials with a specific gravity only slightly higher than the coal and thus pose much more difficult mechanical-cleaning problems. In these instances, the well-known mechanical cleaning units may not be able to produce clean coal of an acceptable quality without excessive losses.

A further effect of high wage rates is evident in cleaning of the larger sizes of the mine-run output, where labor costs for the removal of large refuse by hand-picking often are excessive. Mechanical loading underground tends to pyramid hand-picking costs since the increased refuse content of the mine-run usually is concentrated in the larger sizes.

• **Smaller Sizes More in Demand**—Changes in equipment for burning of coal also are having some influence on this phase of coal cleaning, since the trend is toward the use of the smaller sizes, thus reducing the demand for lump and egg. In a number of coal fields, therefore, the mine-run is crushed to a size where mechanical cleaning can handle the entire output.

Where the refuse is harder to break than the coal, the use of rotary breakers is advantageous. These units consist of a heavy trommel-type screen equipped with lifting plates and anvils. The mine-run material small enough to pass the screen opening is quickly passed through, while the larger material is lifted and dropped on the anvils. The coal breaks until it passes the screen, while much of the refuse is not broken and is discharged from the lower end of

the trommel for disposal by conveyor or other unit.

Experience with the new continuous-mining machines, where one unit breaks the coal at the face and loads it, is not yet extensive enough to establish its effects on coal cleaning. The indications are that little coal above 6 or 8 in will be produced and there is a question whether more minus ¼ and other extreme fines will be made. If so, the cleaning of fine coal may become even more important.

It further appears that, in many instances, the mine-run output may contain less refuse than with mechanical loading, since it may be possible to leave unmined top and bottom strata, which must be removed with regular mechanical loading.

Present indications are that the mechanical coal-cleaning equipment in use in this country over the past 20 yr can still handle most economically a very large proportion of the country's output and produce coal of a quality acceptable to most markets. Baum-type jigs, trough or launder-type units and hydraulic-classifier equipment are successfully cleaning coal up to 6 in and, in some instances, as coarse as 8 in. Where the problem of attaining high quality with a high efficiency of separation is more difficult, the newer heavy-media processes are extending the range of cleaning possibilities.

Heavy-Media Processes

The heavy-media processes employ finely divided solids in suspension in water. The medium solids must be sufficiently high in specific gravity — usually above 2.60—to impart the proper density to the mixture. The density of the medium seldom is less than 1.35, ranging upward to as high as 2.00. The media are of two general types, designated as stable and unstable. With the stable media the solids usually are so fine that there is little if any settlement when the medium is quiescent.

The unstable media require agitation or currents to keep the solids in suspension, or to so control their settlement as to facilitate the desired separation of coal and impurities. Because of the problems involved in contamination of the medium solids by fine coal particles, heavy-media processes generally are limited to coal larger than ¼ in, although finer coal is being treated.

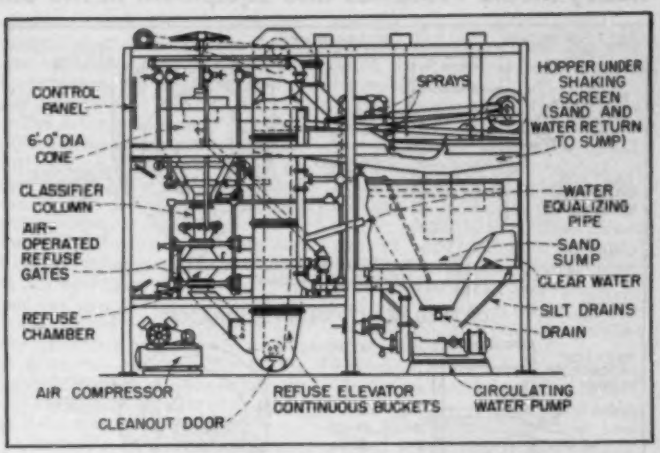

FIG. 1—SAND-FLOTATION CONE and accessory equipment.

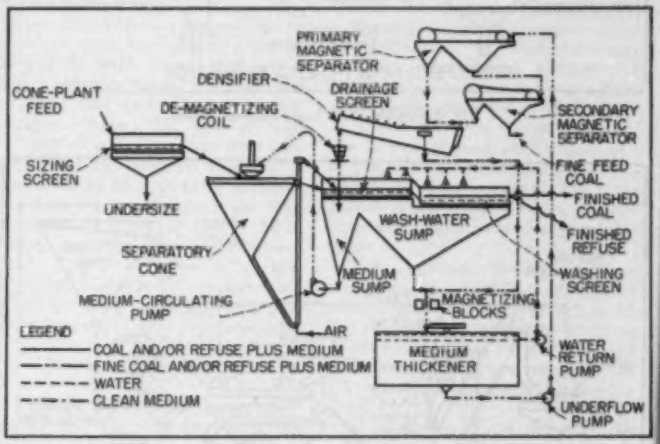

FIG. 2—FLOWSHEET, cone-type heavy-medium cleaning plant.

Sand Flotation

The sand-flotation process is perhaps the oldest heavy-medium process, having been developed in the United States fully 30 yr ago. It utilizes a mixture of water and silica sand. The sand has a specific gravity of about 2.65 and size range of about 20 to 100 mesh, and is kept in suspension in a cone-type vessel by agitation water and mechanical stirring.

Clean coal floats across the top surface of the medium and overflows a weir. The refuse sinks to the bottom of the cone and is intermittently discharged through a double gate. Sand is removed from both coal and refuse products on desanding screens with water sprays. Sand and water are returned to the cone for re-use continuously.

High capacity per cleaning unit is a feature of the sand-flotation process—particularly capacity to remove heavy refuse, which may be as much as 70 to 80% of the feed tonnage. Rather wide size ranges can be satisfactorily separated.

Magnetite Medium

The next heavy-media process developed in this country employs finely ground magnetite (about 5.0 sp gr) suspended in water. For separations in the range from 1.25 to 1.60 sp gr, it usually is necessary to grind the magnetite to essentially all minus 150 mesh, with about 75 to 85% minus 325 mesh. In the gravity range 1.6 to 2.0,

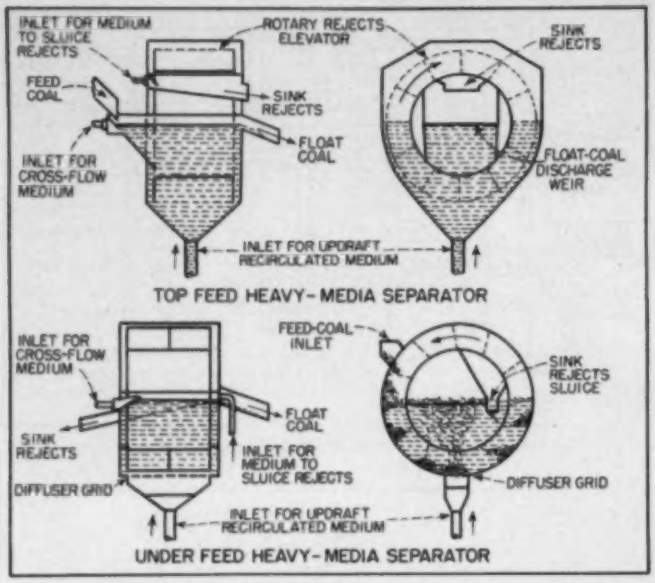

FIG. 3—DRUM-TYPE heavy-medium vessels.

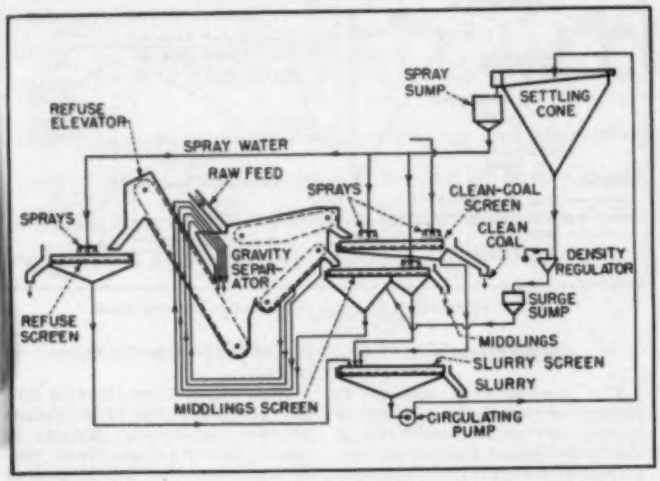

FIG. 4—FLOWSHEET, Holland-developed heavy-medium system.

somewhat coarser magnetite may be used—about 65% minus 325 mesh. Magnetite produces little slimes and can be recovered magnetically. This medium is substantially stable yet quite fluid, with low viscosity, and is relatively easily drained and washed from the products.

• **Cone-Type Separators**—Fig. 2 is a standard flowsheet for a cone-type heavy-medium coal-cleaning plant. While also using a 60-deg cone, this process employs an air lift to remove and elevate the refuse materials to a point above the top of the cone. The feed is delivered into the top of the cone, usually with a stream of medium, and the coal floats around to a weir overflow on the opposite side.

The method of introducing the returned medium is designed to give the effect of a nearly still bath, even though fairly large volumes of medium are flowing through the cone to supply the stream in the air lift and overflow the coal. The bulk of the medium is returned to a feed box over the vertical axis of the cone and fitted with several pipes reaching to different depths.

By controlling the medium delivered to the various depths it is possible to establish either a slight rising current or one downward to the air lift. This permits control of the near-gravity material for delivery either with the coal or the refuse. The cone also is equipped with a slow-moving set of paddles and a raking device to prevent any settlement of medium solids on the inside surface.

Both coal and refuse are discharged with several times their volumes of medium to drainage and washing screens. The first section of each of these screens drains the bulk of the medium from the product, which medium is pumped to the separator for reuse. On the second section of each screen, water sprays remove the remaining medium.

These rinsings also carry some fine coal and refuse and are sent through a magnetizing coil to a medium thickener. The magnetic field of the coil causes the magnetic particles to floc and settle fairly rapidly. Some of the contaminating solids fail to settle and, therefore, overflow the medium thickener, going on to the water-clarifying system.

The medium-thickener underflow is delivered to a magnetic separator where the magnetite is freed from contaminating solids and recovered. The tailings from the magnetic separator join the medium thickener overflow. The recovered magnetite is thickened or densified, usually in a spiral classifier, and sent through a demagnetizing coil on its way to the separating cone for re-use.

Cone-type separators in both the standard and prefabricated semiportable types of plants have been installed to treat coal ranging from 16 mesh to 4 in. However, the air lift for refuse removal must have a diameter three times that of the largest refuse handled and, as velocities must be high, the volume of medium required to lift the refuse tends to become excessive for sizes larger than 4 in.

Separating gravities can be maintained very closely over a range from 1.35 to 1.90 sp gr. Should higher gravities be required, ferrosilicon can be used to attain gravities above 3.0, as is

done with ores. Very sharp separations are obtained over the usual range of gravities used for coal. Where the near-gravity material—plus or minus 0.05 sp gr—does not exceed 10% of the feed, the separations closely approach theoretical. At lower separating gravities where the near-gravity materials much exceed this amount the separation may not be exact, but still is highly efficient.

Except with a very wide range in sizes handled, there is little difference in the separating gravity effected on the individual sizes. As a result of the slight velocities of the medium in the cone, the actual separation usually is at a slightly higher gravity than that of the medium. Usually the increase is less than 0.05.

• **Drum-Type Separators**—Other types of separating vessels have been developed for the magnetite process for economically handling larger sizes of material. These are drum-type vessels (Fig 3), consisting of rotating open-ended drums half-submerged in tanks. In the top-feed vessel the outer surface of the drum is covered with screen plate and interior radial partitions act as lifting members. Means are provided in the bottom of the tank to introduce an upward current of medium or, if desired, to withdraw medium to cause a downward current.

The feed is introduced into one end of the drum at substantially medium level. Usually it is flushed in with a stream of medium. The clean coal is carried on the top of the bath by medium flow to the opposite end of the drum, where both discharge over a weir. The refuse sinks through the bath, is lifted by the radial partitions, and is discharged into a sluice, where a stream of medium carries it out of the vessel above pulp level at the same end as the coal discharge.

In the underfeed separator the outer surface of the drum is not covered so that the feed is delivered to the compartments above the bath. Fixed seals within the tank and drum retain the feed in the compartments until the bottom is reached, where the buoyancy of the bath raises the floats to the surface. This buoyancy can be assisted by an updraft current of medium introduced through a fixed screen in the bottom of the tank. The refuse remaining in the compartment is raised and discharged substantially as in the top-feed separator.

With the drum-type vessels the products, with medium, are discharged to their respective drainage and rinsing screens, and medium recovery is similar to that of the cone vessel (Fig. 2).

The drum-type vessels can handle much larger material—particularly refuse—with less medium recirculation. The top-feed vessel can handle very large tonnages of refuse—50% or more of the feed. Perhaps indicative of the present trend of thought is the fact that in one new plant the top-feed vessels are used to remove the large proportion of heavy refuse, while the underfeed units are installed to treat the coal product of the top-feed vessels at a lower gravity and remove the smaller percentage of bone and low-grade coal.

Ultimately, it is reported, the top size to be treated in the heavy-medium vessels at the preceding plant will be 8 in; bottom size, ¼ in. The refuse removed in the top-feed units has been as much as 75% of the feed. At another operation a top-feed vessel was installed to clean 7x3 and eliminate hand-picking. About 150 tph of feed is handled and the reject averages 40%, varying from 25 to 60%. It was planned to gradually increase the top size, with the hope that material through a 10- or 12-in screen could be satisfactorily handled. There seems to be no mechanical obstacle to the handling of 8- or 10-in material, and perhaps larger, in this top-feed unit.

Heavy Media Abroad

Foreign processes using heavy media include one developed in Holland. Known as the Tromp process, it is now being introduced into the United States. It also utilizes magnetite or other heavy iron-bearing materials, such as spathic iron ore, mill scale, etc., but does not depend on the magnetic properties of the medium solids for their recovery, although magnetic recovery may be utilized with magnetite should that seem desirable. As generally practiced, gavity methods of recovery and cleaning of medium are used and have proven quite satisfactory.

Much coarser magnetite is used, usually only minus 80 mesh, and produces a partly unstable medium. However, the separating vessel is designed to take advantage of this condition, which facilitates the recovery and cleaning of the magnetite by differential settlement. The settling rate of the coarser magnetite is so rapid that the fine contaminating solids can be made to overflow a settling cone while the magnetite settles and is recovered for re-use.

The vessels are built for either two-product (coal and refuse) or three-product separation (coal, middlings or bone, and refuse).

• **Three-Product Separation**—Fig. 4 shows the flowsheet for a three-product installation. The three-product vessel (Fig. 5) is fairly deep and, with the coarser magnetite, settlement takes place so that the specific gravity of the medium is progressively greater with depth.

Advantage is taken of this to effect a separation of the lighter coal, which is carried by the top layer of medium to the top conveyor, which drains the coal of medium and elevates it from the vessel. Both middlings and pure refuse sink through this top layer.

The middlings are supported by middle layers of higher-density medium which flow toward the lower middlings conveyor. This conveyor is provided with a pervious bottom, permitting the middle layers of medium to flow out of the vessel for continuous return as transporting currents. The pure refuse sinks through to the bottom and is removed by a drainage elevator.

The densities in the various strata in the bath are definitely controlled to the desired values by the continuous circulation of three or four circuits of the desired densities, which are returned to the vessel at appropriately varying depths.

As shown in Fig. 4, the coal and refuse products are discharged, drained free of medium, to rinsing screens with approximately 2-mm openings, on which adhering medium is removed by water sprays. The middlings as discharged carry considerable medium, which is drained on the first section of a screen, with the second for rinsing.

Rinsings from the three screens are combined and pass to a slurry screen, making about an 80-mesh separation, where the magnetite and water pass through and any plus 80-mesh contaminating solids are removed and delivered to the fine-coal cleaning section of the plant. The dilute medium from the slurry screen is delivered to a settling cone, where the magnetite settles to a high-density pulp while the excess water, carrying any minus 80-mesh contaminating solids, overflows.

This overflow water is used in

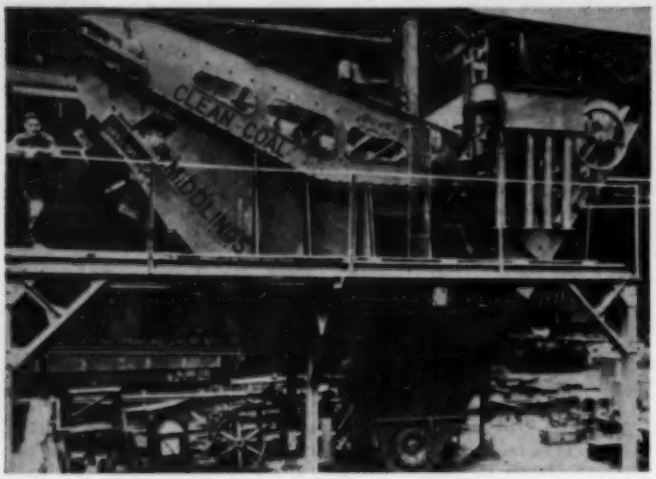

FIG. 5—HOLLAND-DEVELOPED three-product heavy-medium vessel.

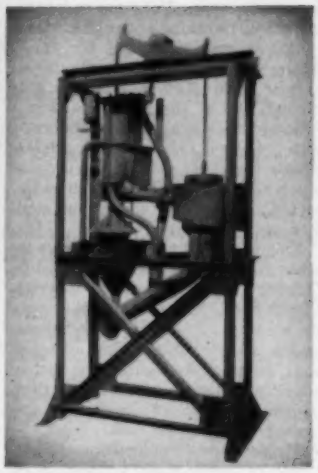

FIG. 6—AUTOMATIC density regulator.

initial sprays on the rinsing screens. The final sprays are clear water. Consequently, there is a constant small excess overflow from the settling cone which purges the medium of minus 80-mesh contamination from the raw coal. The density of the discharge of the recovered medium is automatically controlled by a density regulator (Fig. 6).

• **Density Regulation**—The dense medium recovered by the settling cone is drawn from the bottom of the cone by a pump or air lift and delivered to a point above the cone, from which it normally flows to the medium surge tank for return to the vessel. Above the cone it passes through the density regulator, which is arranged to continually divert a small stream of the dense medium through a weighing cone supported on a scale beam and counterbalanced by a weight selected for the desired density.

Should the medium density be greater than desired, the weighing cone sinks and its movement admits the proper quantity of dilution water to the main stream of recovered medium as it flows to the surge tank. Should the medium density be less than desired, raising of the weighing cone diverts the recovered medium to the settling cone where the additional load causes its underflow to increase in density to the desired amount. With the settling cone underflow at the desired density, the weighing cone is in mid-position when the recovered medium is flowing on to the surge tank.

With the wet prescreening of the feed, a small quantity of water is carried into the bath with the feed. Ultimately, of course, this would lower the density of the medium in the bath and also that directly recirculated. To automatically compensate for such dilution, a bath regulator is provided. Its operation is similar to that of the settling-cone regulator. The density of the medium being returned to the bath is weighed and, in proportion to any drop in density, a portion of its volume is diverted to a small auxiliary settling cone, where the required quantity of dilution water is removed.

The automatic-density regulators provide very precise control of the specific gravity of the bath in the separating vessel, according to Dr. O. Schafer. He recorded bath density every 20 min for nearly 5 hr, with the following results:

Average density	1.5358
Average deviation...	+0.0014
	−0.0008
Probable variation...	0.0009

"These results," Dr. Schafer states, "indicate a maximum range of density variation of, say, 0.003 sp gr in the separation between clean coal and middlings." He further indicated that with a lower-density medium the variation would be correspondingly reduced.

As the operating results show that the separations made by the bath are accurate to within a small percentage of the feed coal found in the range of plus or minus 0.02 bath density, it is quite important that a uniform density be maintained. So far, the Tromp is the only heavy-medium system which has used automatic density regulators over a number of years. This feature, which largely eliminates operator attention, is quite valuable in continuously maintaining very sharp separations at the desired density.

As an illustration of the sharpness of the separations effected we have test results by the French Coal Administration on the installation in the north of France. This installation is cleaning a 2x½ coal, separating clean coal at 1.747 sp gr and recovering a middlings product from the refuse at 2.012. The weight recovery was:

Clean coal	59.56%
Middlings	4.02%
Refuse	36.42%

The clean-coal product contained 0.10% sink while the middlings contained 2.0% float at 1.747. The sink in the clean coal represents 0.06% and the float in the refuse 0.08% of the feed. Thus, the total misplaced material is only 0.14% of the feed. The feed contained 0.8% by weight between 1.727 and 1.767 sp gr, so that the total misplaced material is only 17.5% of the plus or minus 0.02 sp gr.

If this coal was cleaned by a conventional coal-cleaning unit at this separating gravity, the misplaced material would total about 2.0% of the feed instead of only 0.14%. This means that the ash

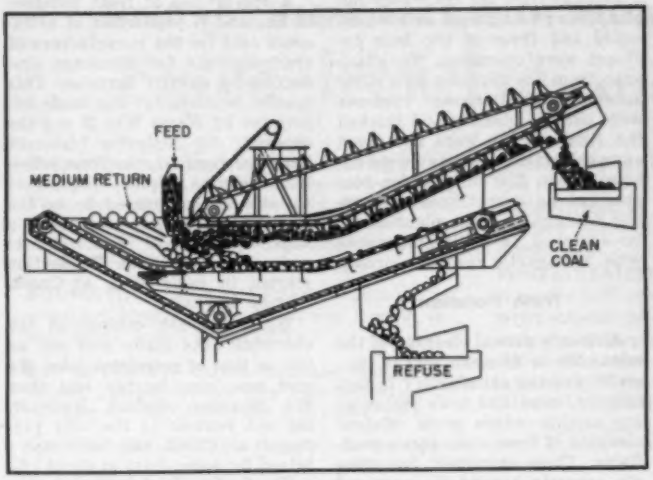

FIG. 7—TWO-PRODUCT Holland-developed heavy-medium vessel.

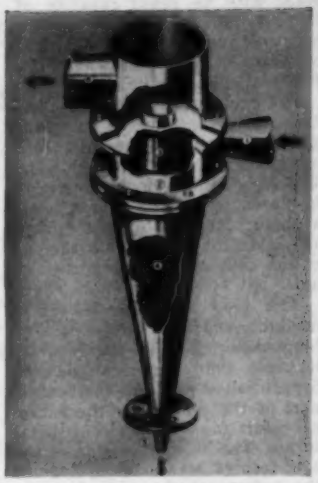

FIG. 8—DUTCH cyclone separator.

content of the clean coal would be increased by at least 0.5%, or should the same ash content of clean coal be required the conventional equipment would have to make a separation at a lower gravity, with a loss of several percent in recovery.

In separating middlings and refuse, sink in the middlings was only 1.0%, while the float in the refuse was 0.33%, at a gravity of 2.012. On a feed basis the figures are 0.04% and 0.12%, respectively, or a total misplacement of 0.16% of the feed. The feed contains 0.5% of material between 1.992 and 2.032, so that the total misplaced material is 24% of the material in the feed plus or minus 0.02 of the separating density.

I have no accurate test data showing an equivalent separation by conventional coal-cleaning equipment, but it is certain that it would be far less efficient.

These separations on French coal are in a much higher gravity range than is usual in this country, except when cleaning anthracite. That the Tromp process also is highly efficient when separating at low densities is shown by a test on 3½x⅞, foreign coal treated in a three-product bath at 1.352, with middlings and refuse separated at about 1.85. The separation between coal and middlings at 1.352 resulted in a total misplaced material of only 6% of the material in the feed plus or minus 0.02 of the separating density.

• **Two-Product Vessel**—The two-product vessel (Fig. 7) separates the feed into coal and refuse only and is quite shallow. The float coal is removed by a flight conveyor, which also drains the medium from the coal so that only rinsing is done on the coal screen. The refuse is removed by the lower flight conveyor and is accompanied by a stream of medium, which is drained on the first section of the refuse screen, followed by rinsing with water sprays.

The recirculated medium is introduced back of the feed point and provides horizontal currents to float the coal into the coal conveyor. These currents continue to and overflow at the refuse-discharge point. The medium-recovery circuit with the automatic-density controls is substantially the same as for the three-product vessel.

Early in 1950 a total of 37 Tromp vessels had been installed in 21 coal-cleaning plants in Europe, with a total input capacity of 2,800 tph. These vessels are cleaning a wide variety of size ranges. The largest coal handled is 12 in top size and the finest material is 1/5 in bottom size. These European installations are in Belgium, France, Germany, Great Britain, Holland and Poland.

The first installation in the United States is now being made in Illinois at a new property being developed in the No. 6 Seam. The preparation plant has an input capacity of 800 tph mine-run crushed to minus 6½ in. The 6½x1½, about 300 tph, will be separated at about 1.36 sp gr in two two-product vessels and the 1½x⅝/16 coal, about 285 tph, in two similar vessels at about 1.43. The rejects from these vessels, plus 1-in square, will be retreated in a fifth two-product vessel at 1.60. The rejects from this vessel are final refuse and the float product will be crushed to free coal from the laminated bone and will be recirculated to the raw-coal screens for retreatment.

The preceding outlines developments in this country for new cleaning equipment capable of handling coal larger than ¼ in. and separating it more precisely and at lower densities than heretofore. In Europe, additional heavy media processes have been developed but are not yet used here.

Fine-Coal Cleaning

Development of processes for cleaning fine coal about ¼ in and smaller has been less active than in the field of coarse-coal treatment, probably because the need has not so far been so urgent. Launder-type equipment, coal washing tables, upward-current equipment and the like are generally giving satisfactory results as to quality and recovery.

Heavy-Medium Cyclone

One new device which brings into play heavy media as an element in effecting separation is the Dutch State Mines cyclone separator. This was developed in Holland where the Dutch State Mines have a commercial-scale pilot

plant with an input capacity of 40 to 50 tph. So far as I know, it has not yet been adopted on a commercial basis elsewhere for fine coal, but may be shortly.

The cyclone separator (Fig. 8) consists essentially of a short cylindrical section superimposed on a very steeply pitched cone. The top of the cylindrical section is closed by a plate which holds a short pipe, the "vortex finder" (3), extending down into the top of the cone and centered over its axis.

The feed is suspended in a medium and this pulp is fed tangentially through the feed inlet into the cylindrical section. Separation is made in the conical part of the cyclone by the action of centrifugal and centripetal forces. The heavier portion of the coal treated leaves the cyclone at the bottom of the cone and the lighter portion overflows at the top orifice after passing through the vortex finder.

A magnetite medium seems ideal for coal cleaning, although the Dutch State Mines have used coal-flotation tailings extensively. The feed medium is necessarily made substantially lower in specific gravity than that of the desired separation because of the concentrating effect of the forces within the cyclone. For efficient separation, the volume of medium circulated is generally 3 to 6 times the volume of the feed.

The flowsheet of the facilities for recovering, cleaning and returning the medium are substantially the same as for the cleaning of larger coal, except that the rinsings from the refuse and coal products are handled in separate cleaning and recovery circuits. All the medium leaving the cyclone does not require cleaning before reuse. The proportion of the medium in circulation requiring cleaning is largely determined by the percentage of extreme fines in the coal being treated.

Generally, a cyclone with a 350-mm (13¾-in) maximum diameter has been found to give optimum results. The operating pressure will vary from 20 to 40 psi.

I visited the Dutch State Mines pilot plant in September, 1949. At that time it consisted of a prescreen to remove the bulk of the minus 28-mesh raw coal, which was cleaned separately by froth flotation; four 350-mm cyclone separators in parallel; and screens for draining medium and rinsing the products.

Tailings from the froth-flotation plant were being used as medium solids and three of the four cyclones were operating. To eliminate from the medium any slime accumulation Driessen cyclones were used to classify and thicken the rinsings. We were not given any performance data and were advised, when full information was obtained on operation with flotation tailings, that the plant would be equipped to utilize magnetite with a magnetic recovery circuit.

Froth Flotation

Although partial cleaning of the minus 28- or 48-mesh coal is generally proving satisfactory in this country, more and more instances are arising where more efficient cleaning of these sizes seems profitable. These extremely fine sizes are properly beyond the scope of gravity separations and froth flotation seems desirable, especially since fines are becoming a more valuable fuel as installations that can burn them increase. It is logical, therefore, that froth flotation to clean minus 28- or 48-mesh coal will increase.

Froth flotation, briefly, requires:

1. Low wettability by water of the coal to be floated and high wettability by water of the material to be rejected. The difference in wettability can sometimes be extended by wetting with a reagent that alters the surface energy of one or the other material.

2. Process water that is easily aerated.

3. Reagents to induce the formation of bubbles and also stabilize the froth formed.

4. Particles treated small enough to be separated from extraneous matter and light enough to be carried by the weakest bubble.

The feed pulp is aerated in the flotation cells to form the froth, which overflows carrying the coal, while the refuse discharges at a lower level with the bulk of the process water.

In Europe, during recent years, froth flotation has been rather widely used to clean the extremely fine coal, particularly where the coal is used for special purposes, such as coke-making. Froth flotation was originally conceived for ore concentration in England but has been extensively developed and improved in this country. It is interesting that England, in the past few years, has installed nearly 200 American-type cells to clean fine coal.

A special use of froth flotation in England is production of ultra-clean coal for the manufacture of electrode coke for aluminum production by electric furnaces. This special development was made imperative by World War II and the necessity for replacing high-cost imported residual coke from petroleum refining. Froth flotation of suitable coal appeared to be the most promising way to produce a super low-ash coal from which to make electrode coke. Production started in early 1941, at Crook, County Durham.

While the ash content of the electrode coke made was not as low as that of petroleum coke, the cost was considerably less than the imported product. However, the ash content of the coke produced at Crook has been maintained for some years at about 1%.

The feed to the flotation plant is washed coal containing about 8% ash from two washeries, reduced by stage crushing to minus ⅛ in. Final crushing is done in a ball mill in closed circuit with a wet screen.

The float plant makes three products: superclean coal, low-ash foundry coal, and tailing or refuse. The last contains up to 30% coal floating at 1.6 sp gr, which has been discarded mainly because of its large particle size and partly because it is unsuitable for flotation. The tailings, therefore, are treated on a wet concentrating table where the bulk of the coal is recovered.

Plant feed is 15 gross tons per hour, and the following ash balance is typical:

Product	Per Cent Wt.	Per Cent Ash	Per Cent Ash Dist.
Superclean coal	40	0.70	3.6
Low ash foundry coal	48	2.60	15.9
Coal from table	3	10.30	4.0
Tailings	9	66.50	76.5
Calculated feed	100	7.82	100.0

The superclean coal and low-ash foundry coal are separately filtered on drum-type vacuum filters and sent to the coke plant for the separate manufacture of electrode and foundry coke.

In Germany, during the last war, froth flotation was similarly used to produce superclean coal for electrode coke. Our U. S. Bureau of Mines has done considerable research and experimental work at their various laboratories aimed at the production of ultra-clean coal where froth flotation is employed.

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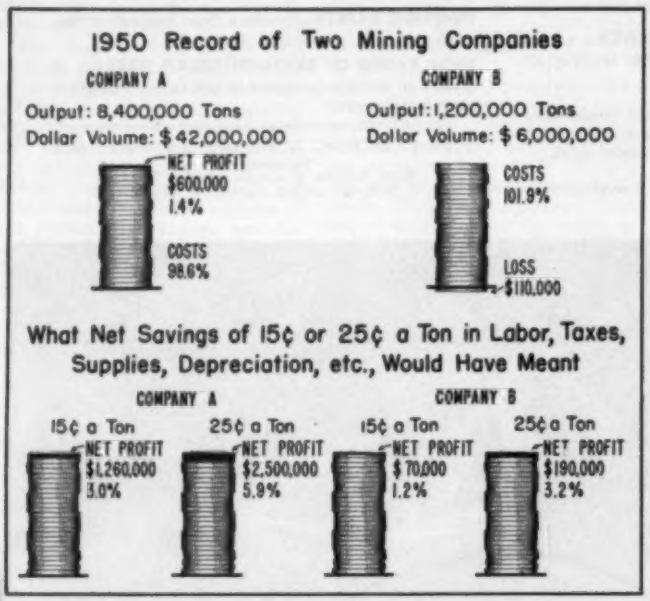
1888...DEPENDABLE BATTERIES FOR 63 YEARS...1951



Make the Eagle Scream!

Two Approaches to Coal's Problem of Costs:

1. "Don't Do It, It Will Cost Money"

2. "Do It, It Will Save Money"

Here's a Plug for the Latter Idea

PROFIT AND LOSS in the coal business sometimes are but a hair's breadth apart. For proof, look at some figures from mining-company financial statements for 1950, as follows:

1. Company A sold almost $42 million worth of coal for which it received a net profit of about $600 thousand. This means that in every dollar received from the sale of coal there was a far-from-magnificent profit of 1.4¢.

2. Company B sold $6 million worth of coal and lost more than $110 thousand in the process. In other words, for every dollar spent in placing coal on the market the company received only 98.2¢ in return.

In the first instance it would be highly desirable to widen the margin of safety, and in the other to reverse the situation. Production supervisors can aid either effort by squeezing full value from every dollar spent by the company in their mine or section.

For example, if this dollar volume were figured on sales at an average of $5.00 a ton, squeezing costs to add a net of only 15¢ a ton to Company A's profits would have boosted its total net income to $1,260,000, or 3.0% of sales, instead of the $600,000 it actually earned. Total net savings of 25¢ a ton in the section would have meant a total net profit of $1,250,000, or 5.9% of sales.

In the case of Company B, net savings of 15¢ a ton would have pulled it out of the red and produced an income of $70,000 — which, while still not large, would have been a lot better than the loss it suffered. If Company B could have saved 25¢ a ton, it would have ended the year with a net of $190,000 or 3.2% of sales.

In seeking ways to help reduce the cost of putting coal in railroad cars at the tipple, the logical first step is to examine a list of the major costs involved in the process. Costs that are most directly affected by section operations naturally offer the best opportunity for improving company health, as far as the production boss is concerned. Major costs, of course, are outlays for labor, supplies and power along with such overhead expenses as taxes, depreciation and so on. Overhead is not commonly a direct responsibility of the section boss, but what he does nevertheless has an effect on it. In labor, supplies and power, the section foreman's activities are direct and significant.

The supervisor's attack on costs can be guided by either (1) emphasis on cutting costs for the sake of cutting costs, or (2) emphasis on getting a dollar's value from every dollar spent. Under today's conditions, marked by prospects of rising demand and a realization by most companies that they must spend money to make money, the second incentive is more desirable because it implies progress rather than curtailment. Therefore, the following is slanted toward securing full value for the cost dollar.

The cost of labor takes most of the money earmarked by the company for operating any section. This is a result not only of the industry's present high wage scale, but also of the incomplete use of available man-hours. Little, if anything, can be done about the wage scale, but in most instances available man-hours can be *more* profitably utilized—and that's where the section boss can shine.

Ground rules for achieving fuller use of operating time have been discussed at length in many articles, so the subject need not be expanded here. However it should be noted that machine-hours as well as man-hours, are

expensive and real economy in labor cost demands the dovetailed effort of men and machines. The balanced operating cycle resulting from such harmony will help keep labor costs from soaring.

Supplies also take a big bite from the operating dollar. Preventing waste, or rather conserving supplies, is the best way to milk full value from the money spent on supplies. Conserving supplies is substituted because intelligent use of materials, as well as prevention of waste, is implicit in the term. An operating official can eliminate much waste by hoarding supplies so that they will not be lost or damaged, but hoarded supplies add nothing to production efficiency. More desirable is the habit of applying this auxiliary material to the job for which it was designed, while being careful to prevent abuse and misuse, two factors that limit the effectiveness of the money spent for supplies.

Right now conservation is especially important because the cost of replacement material is rising. Premature "death" of a supply item, therefore, wastes more than its original cost; the price of the replacement is wasted.

Now consider other costs not so closely associated with section operations. Can operating officials help at all in lightening the company's tax burden? They can in the sense that section and mine foremen can insure the full value of the tax dollar by striving to increase the percentage of recovery. Property and other taxes reflect the amount of coal in the ground, so higher recovery means greater value received for tax disbursements. Here is how it works:

Taxing authorities evaluate the company's property, with the coal in place considered as part of the value. Since taxes are paid on the coal in place, each ton that leaves the mine pays a part of the total taxes, and the more tons that leave the property during its life, the lower the tax the company pays per ton.

High recovery reduces cost per ton in another way. Mining companies spend vast sums in developing coal seams. Thereafter each ton produced as a result of that development bears some of the development cost. It follows then that if a stump containing 20 tons is abandoned the development cost for those 20 tons is lost, along with the profit that might have been realized from their sale. High extraction means more value from the money spent for development.

How about the depreciation dollar? This is the money the company sets aside out of current earnings to buy new equipment when machines now in use are worn out. It follows that if machines are worn out too fast, through neglected maintenance and improper operation, the replacement fund will not be built to a point where new machines can be bought without raiding some other fund. No one prospers for any length of time by "robbing Peter to pay Paul." Usually the deficit must come from the company's capital, and each invasion of capital leaves the company slightly more anemic.

Selling the mine product involves certain costs. Highest quality coals almost "sell themselves," with those of lesser quality competing for the market that remains. Efficient face preparation is the first step in producing quality coal and mine supervisors control this operation. The company will have to spend money to promote its product in the good opinion of customers and high quality initiated at the face will keep it there. Then each sales dollar does a better job.

Finally, there are two familiar themes of any discussion on foremanship, good housekeeping and improved labor relations. The first saves material, improves safety and provides a better working environment, all credits in the cost picture. The second is one phase of industrial activity where more remains to be done than has yet been done. J. F. Lincoln, president, Lincoln Electric Co., Cleveland, Ohio, recently stated that if we could solve our human - relations problems we could expect as much improvement in our product and production costs over the next decade as we have made in the past 25 yr through technical advances.*

Cost control is not a negative operation—it is positive action.

Fooling Ourselves

HITLER said something similar to the following: "If you tell a lie big enough and often enough, people will believe it." How gullible can we be sometimes, especially to political slogans and "catch phrases?" Here are a few examples.

"All men are created equal!" No man who stood in line at an Army Induction Center will ever believe Abraham Lincoln was infallible. Some men are stronger or weaker, larger or smaller, brighter or duller than others.

"Soak the rich," or "Increase corporation taxes!" With rare exceptions these cannot be done! Slap taxes and more taxes on business and all they do — generally all they can do — is increase the price to cover the taxes. When the consumer buys the product he pays increased prices, which in turn pay the increased taxes of the business.

But political catch phrases are not our concern except to show by example how much self-deception we practice. In coal mining the catch phrase we hide our shortcomings behind is the word "ACCIDENT."

Do *you* really think that most mine injuries are accidents? Do you *know* what an accident is? Here is the definition from Webster's unabridged dictionary:

"Accident:. Lit., a befalling; an event that takes place without one's foresight or expectation; . . ."

Let us examine some of these so-called "accidents." A miner neglects to timber his place and the roof falls on him. Most people call it an accident, but was it? Was this without expectation? Can you expect unsupported roof to overcome the law of gravity, or can you expect it to fall?

A workman rides on a conveyor belt in a sitting position and bumps his head on a header, resulting in a broken back. Was this unforeseen? Before the first belt conveyor was ever installed for this company our Office of Accident Prevention published a rule that men should lie in a prone position when riding a belt. We foresaw the possibility and the workman was instructed. Was this an "accident"? Not according to the dictionary.

An electric drill became charged because there was no third wire or means of frame-grounding it. A workman was shocked and knocked to the ground with serious injury. For years our company rules have required drills to be frame-grounded. We, the Bureau of Mines and the State Department of Mines, realized the danger. This could not have been an accident because it was foreseen, but it could properly be called neglect.

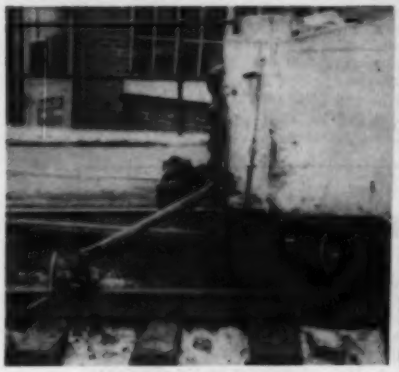
A brakeman scotches a car with a wedge and it gets away, running into a locomotive and injuring the motorman. An accident? If this wasn't foreseen, why do you think this Company has invested perhaps $50,000 in safety chains in the last 15 yr?

Thousands of "Accident Reports" have crossed your editor's desk. Accidents, hell! According to the dictionary, roughly not more than five out of each hundred were accidents! Why kid ourselves? Why do the State reports and the National Safety Council call them accidents? What are we trying to do—console the injured person by calling his chance-taking an accident? Are we trying to hide management's neglect behind the flimsy word called an "accident"?

"Accidental Injury!" The term is inappropriate, deceptive, compromising, a lie. It might have been "injured from neglect" or "injury from disobedience" or some other name or term, but certainly not accidental injury. We might as well say that most people sin accidentally as to say that most coal-mine injuries are accidental. To stop injuries we must first decide to stop fooling ourselves into believing they are accidents.

—Adapted from Safety News Letter Eastern Gas & Fuel Associates

Operating Ideas



UP SLOPE . . .

DOWN SLOPE . . .

ROPE TROUBLE . . .

Man-Car Drag Features Positive Action at Moment of Need

A RAIL-RIDING SAFETY DRAG that provides positive action to jack the man-trip car off the track in the event of rope failure is a product of the machine shop at Springdale mine, Allegheny Pittsburgh Coal Co., Logan's Ferry, Pa., under the direction of George N. Truby, master mechanic.

As the car is hoisted up the slope the hard-faced shoe on the drag slides along the rail, held in position atop the rail by pointed steel lugs that slide along the sides of the rail head. If the direction of travel is reversed, as in rope failure, the lugs, pivoted at the shoe, are turned down into the roadbed or ties, thus jacking one end of the car off the road immediately. The lug assembly is prevented from overturning by a stirrup that strikes the top of the rail when the lugs are in position to act.

The new drag eliminates wear and tear on slope ties and will not bounce out of position.

Mr. Truby has a duplicate of the drag available in the shop so that a replacement is at hand in the event of damage to the original or if resurfacing becomes necessary.

Stack Erected at Fan Removes Undiluted Gas Quickly and Safely

THIS 70-FT FAN STACK carried a 75% methane mixture to a safe level above the ground, quickly and safely.

AVOIDING A MINE SHUTDOWN and reducing the possibility of explosion, a 70-ft stack erected at a fan permitted speedy removal of methane in a sealed area without dilution. The stack installation, at Rosita No. 6 coal mine of Cia. Carbonifera de Sabinas, S. A., a subsidiary of the American Smelting & Refining Co., in the state of Coahuila, Mexico, was included in a paper on a mine fire and recovery work by Karl Marshall, director of safety, speaking at the 1950 meeting of the Kentucky Mining Institute, Lexington.

The fire zone had been sealed for over 5 mo and a typical sample of the atmosphere showed the following percentages: methane, 75; oxygen, 0.7; carbon dioxide, 1.5; carbon monoxide, 0; and nitrogen (by difference), 22.8. Removing the gas was accomplished in about 5 hr. Residents of a few nearby houses were moved out and guards posted during the period, but no gas was detected at ground level anywhere in the vicinity.

Why Make Orphans . . .

OF YOUR GOOD IDEAS? TELL COAL AGE about your successful "Operating Ideas" and we'll publish them for the benefit of other mining men. And we'll pay you $5 or more for each acceptable idea, on publication. Just describe them in your own words and write: The Editor, COAL AGE, 330 W. 42 St., New York 18, N. Y.

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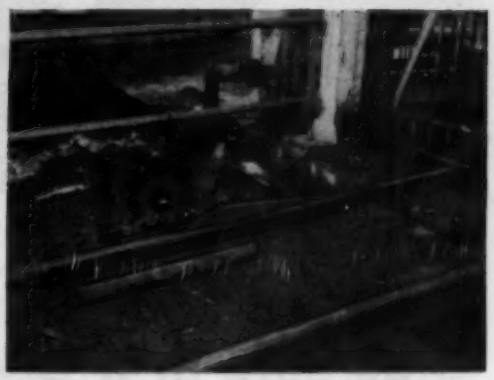
UNION SUPPLY CO. Denver 3, Colo.

CIRCLE RAIL and positive lock for counterbalanced cage gate are pointed out by Mr. Lehman in left photo. Points of interest in right photo are rope drums and steel spring cylinders at far end of cage.

SAFETY STOP to prevent main shaft gate from dropping unexpectedly is controlled by head attendant.



TRIPPING LEVER for reclosing car-holding dogs on cage is longer than car wheelbase to eliminate derailment of rear wheels.

Shaft Safety Increased by Three Shop-Made Cage Attachments

SAFER OPERATION of cages at Maryland No. 2 shaft, Berwind-White Coal Mining Co., Wilmore, Pa., is assured by three protective devices designed by Norman Lehman, master mechanic. Now in service at Maryland shaft are: (1) a counterbalanced cage gate that replaces the single-strand chain formerly used to close the cage during man-hoists; (2) a manually-operated safety stop to prevent the shaft gate from dropping unexpectedly; and (3) a special tripper for reclosing cage dogs to prevent derailment of cars leaving the cage.

The counterbalanced gate increases safety for cage passengers because it provides a barrier from the floor of the cage up to chest height. It slides in circle rails up over the heads of the cage occupants to open the cage. Counterbalance is provided by springs in steel cylinders at the other end of the cage. When closed, the gate is held down against the tension of the springs by bar locks that extend from the top rail of the gate through holes in the circle rails. Counterbalancing permits the gate to be raised or lowered with minimum effort.

Because the length of gate travel exceeds the length of spring motion, two drums of different diameter are mounted on each end of an overhead shaft at the other end of the cage, the large drums serving the gate ropes and the small drums the spring ropes.

The main gates at the head of the shaft, which deny access to the shaft when the cage is below the surface, are operated by an electric motor. A wire rope fixed to a drum on the motor raises and lowers the gates. In the event power failure, rope breakage or mechanical defect disrupts the system, the gate is prevented from dropping on men entering or leaving the cage by a safety stop inserted under the raised gate by the head attendant. The stop, a steel bar that slides through the gate guides, is connected to levers within easy reach of the attendant's bell station at the head of the shaft.

As a further precaution, Mr. Lehman welded steel pipe along the bottom of each gate to eliminate the hazard presented by the exposed ends of the vertical steel rods that form the gate grill.

Car-actuated trippers, which reclose the car-holding dogs on cages, were redesigned by Mr. Lehman to eliminate derailment of the car leaving the cage. The tripping lever was lengthened and set into a longitudinal recess in the rail. Now the front wheels of a car depress the lever and the rear wheels engage the lever before the front wheels leave it, thus preventing the lever from rising between the wheels. Formerly, a shorter tripping lever bobbed up between front and rear wheels of cars and any misalignment resulted in a derailed car. Fewer derailments mean fewer injury possibilities.

STILL IN SERVICE AFTER *Five Tough years!*

This O-B Type-M Frog has outlasted other frogs used in the same spot by more than four and one-half years. In this same location, other frogs had lasted on the average for about twelve months, or 40,000 collector passes. In November of 1950, when this photograph was made, the Type-M Frog had guided 180,000 collector passes, and the picture shows it to be ready for many, many more, despite some evidence of wear. Five and one-half years is an excellent record for a frog in such a spot.

In September of 1945, this O-B Frog was put in use under severe haulage conditions. Located near the middle of a 1.8 per cent grade against the load, the frog enables motormen with outbound trips to move through the turnout without reducing speed, without fear of dewirements or flying poles. In such a location, definite and sure turnout action is a must. Without it, motormen would be compelled to slow down or stop, and then regain speed while moving against the grade. Thanks to the Type-M Frog, haulage proceeds without delay.

This performance is typical of the complete "High Mileage" line of trolley materials. Get longer life and better performance from your overhead with O-B "High Mileage" Trolley Materials.

HAULAGE WAYS *Jr.*

The O-B Type-M Frog is particularly well adapted for high speed haulage. It is shown here with Bulldog Tips which butt the wire securely against the ends of the frog runners.

This picture was taken five and one-half years after the Type-M Frog shown was installed. Although it has guided 180,000 collector passes in this time, it will continue in use under these severe haulage conditions.

Ohio Brass

MANSFIELD OHIO, U. S. A.

CANADIAN OHIO BRASS CO., LTD., NIAGARA FALLS, ONT.

HAULAGE WAYS Jr.

Easy to attach, handy to use

O-B Taps Save Time Throughout the Mine

● Wherever they're handled in the mine, O-B Fused Taps make the worker's job easier. When they're in use, or being attached to the cable, or when they're in the store-room waiting to go to work, O-B Form-H and Form-J Taps make things easier for the men who handle them.

In use, for example, there's a selection of six contacts, each of which is designed for a specific power-tapping application. Any one of the six can be used on a single tap, for they are interchangeable. Two are intended for use with small, portable equipment. One is used at room turnouts to serve the self-propelled machinery advancing and retreating from the room. The remaining three provide a choice of contacts for semi-permanent connections.

The fuse-holding ends of the terminals are designed to fit either the regular ferrule type fuses or those with stud ends. With one tap you are able to use whichever fuse is best suited to your operating conditions.

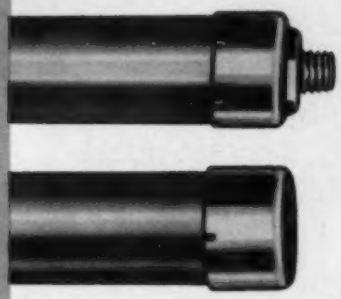
Cable attachment is made in a few minutes. Either of two terminal styles can be used. One employs two set screws to hold the cable in place; the other uses a cam to keep the strand held tight. The cam-type terminal is used in two sketches which show how readily the cable is attached. First, the bare, straight cable end is run into the terminal. Then the cam is hammered down with whatever tool is handy—a pliers in this case—onto the cable to hold it tight. No special tools, no special cable preparation—nothing but simplicity in fastening cable to the new O-B Taps.

Then there's the matter of storing taps in the stock room until they're put to use in the mine. Their bright orange cartons are readily stacked, quickly recognized, and the tap styles are clearly marked on the ends of each box. You can find the tap you want in a hurry.

In stock or in use, O-B Form-H and Form-J Taps make mine work easier. Complete information on their fuses, terminals and contacts was mailed to Haulage Ways readers in catalog insert No. 901-M. If your copy has been misplaced, write for another for ordering information.

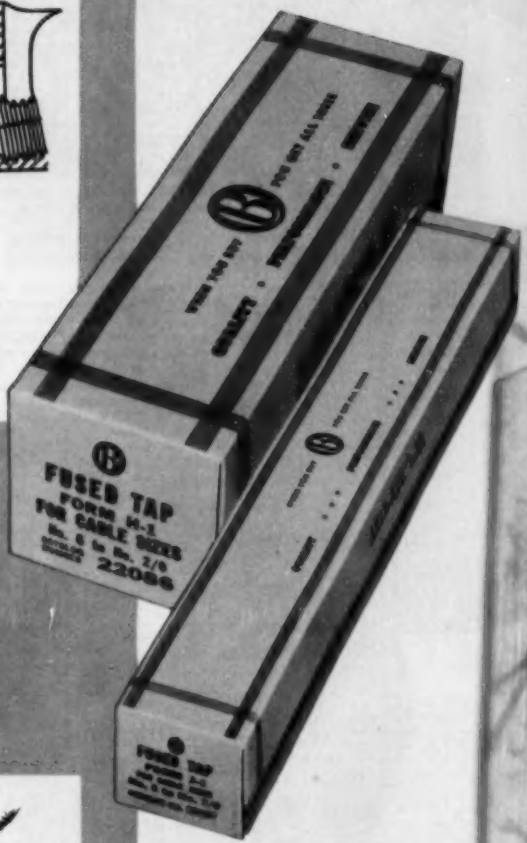
CHOICE OF SIX CONTACTS

The spring-type contact in place on the Form-H Tap can be exchanged for any of the other five shown separately. From this assortment of six you can select a contact suited to your particular power-tapping requirement.



TERMINALS TAKE EITHER FUSE

Design of the fuse-holding end of the Form-H and Form-J Tap Terminals permits a wider choice of fuses for the various power demands in mechanical mining. Either the regular ferrule end or the stud end fuses can be seated in the same fuse holder.



TWO EASY ATTACHMENT METHODS

The two drawings show the cam-type H-2 Terminal being attached to the cable. High holding strength, ease in fastening, and choice of fastening method are features of the terminals used in the O-B Form-H and Form-J Fused Taps.

CONVENIENT PACKAGING

Cartons for the Form-H and Form-J Fused Taps make stocking and identification a simple matter.

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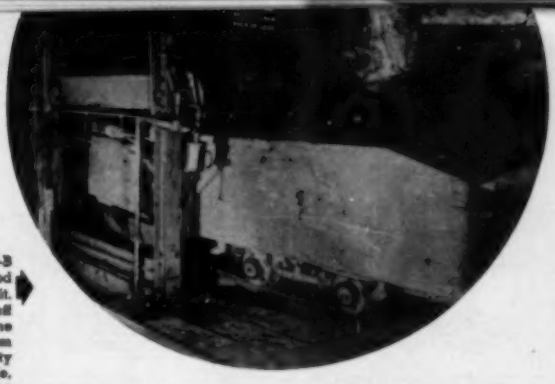
HAULAGE WAYS Jr.



In this caging operation, O-B Automatic Couplers get a good beating, but they can take it. The empty car is bumped off of the cage by a loaded one which rolls onto the cage from an inclined track. The empty rolls away on the other side, and couples into the waiting string of empties. Rubber draft gear keeps the O-B couplers ready for the repeated blows they receive in this service.

Empties roll back from the dump, down the incline and into the empty trip, where they couple automatically. Couplers in this operation get more than a fair share of abuse, but the close-up, showing two empties coming together, show how well the rubber draft gear has protected them. Coupler heads are in line, free of sag, and ready to do their job.

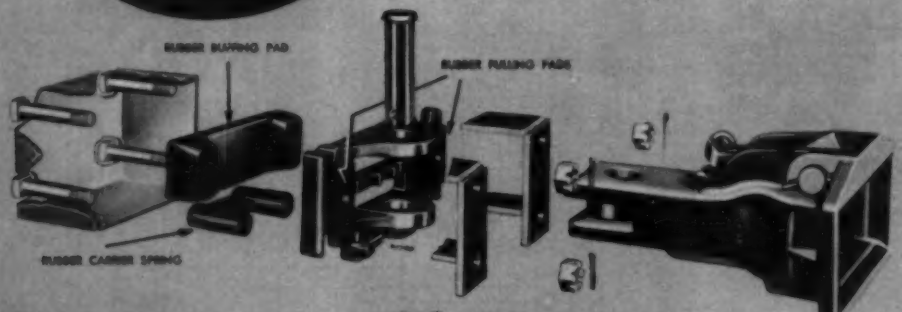
Knocked Around But *NEVER KNOCKED OUT!*

O-B Couplers stand up against tough use

A good boxer knows how to ride with the punch when he must. Rather than meet it with a rigid body, he gives a little bit, and the blow does no damage. Just like the boxer, an O-B Automatic Mine Car Coupler rides with the punch also, and comes back ready for the next with no damage done to either the coupler or the car. Unlike the boxer, however, a coupler can't duck. Every whack that comes its way must be met, and that's why the rubber draft gear—tough, resilient and durable—is so important. This draft gear is made to absorb impact blows of as much as 100,000 pounds with strength to spare. Couplers and cars both stand up when they are equipped to absorb the punishment of coal mine haulage. That's why we say that O-B Automatic Couplers are knocked around but never knocked out!

Talk with your O-B representative to find out more about the protection O-B couplers provide for your cars.

4091-M



Tough, durable rubber draft gear keeps coupler heads ready for use, absorbs the impact when cars come together, and protects both cars and their coupler heads from damage.

Ohio Brass

MANSFIELD OHIO, U. S. A.

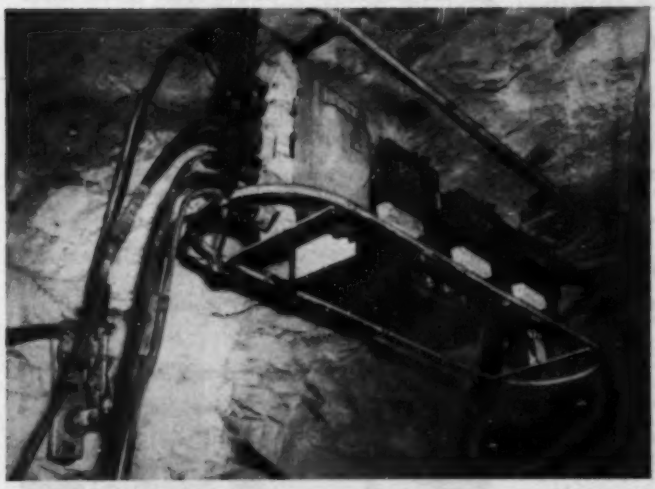
CANADIAN OHIO BRASS CO., LTD., NIAGARA FALLS, ONT.

Drill Motor Powers Mine-Built Moving Truck

THE BACK-BREAKING WORK of moving an electric post-mounted drill and equipment from place to place is largely eliminated with the drill truck shown above, which is powered by the drill's electric motor. The truck, in use at Mine No. 47, Peabody Coal Co., Harco, Ill., was designed and built by Charles Boyett, now foreman of the dust drier.

When the drillers reach the working face, the drill is unlocked from the truck and rigged with the post for drilling (left). With a face completed (right), Drillers Mike Fitzsimmons (left) and Furman Hooper prepare to lock the drill into the truck for moving to the next place. Power is transmitted through the drill's thread bar to a short drive shaft. Wheels and differential are taken from a Model A Ford rear end. Mr. Fitzsimmons points to the spot where the drill will be placed.

Conveyor Panels Are Simple, Easy to Handle



MINE-DESIGNED PANEL BOARD for conveyor mining is hung from the roof at the belt head and can be skidded or rolled into position.

EXPERIENCE WITH 2,000-FT BELT CONVEYORS in mines of The New River Co., Fayette and Raleigh counties, West Virginia, demonstrated the need for an electrical-distribution panel made up as a unit with standard replaceable equipment and plug connectors. Mechanical protection to permit the unit being rolled or skidded into position and installation where it would not be likely to have material or trash piled on it also were factors. A satisfactory design was worked out under the guidance of C. C. Ballard, master mechanic, and several of the panels have been assembled in the company's central cable and control shop at Kilsyth.

The accompanying photograph, made at a belt head in Stanaford No. 2 mine, shows a panel in service at the entrance to a conveyor section. It is hung from the mine roof where it is out of the way and there is no chance of anything being placed on or against it. Three automatic circuit breakers and a fused safety switch are mounted on the front of a skeleton steel frame and two magnetic contactors are installed on the back. Receptacles for power, feed and control connections are lined up at the two ends and functions of the various receptacles, switches and breakers are plainly labeled. From top to bottom, the six receptacles at the near end are "Pos.," "Tail Hoist," "Head Hoist," "Head Hoist," "Neg." and "C. G.," while the five at the rear are labeled "Power," "21-25," "Belt," "Room Conv." and "Tail Hoist."

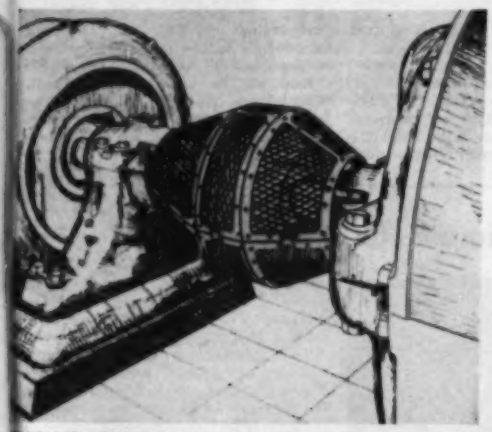
Two oblong guards of ¾-in pipe encircle each side to provide the protection required when moving the panel. With the guards used as runners and handles, the unit can be rolled to any of the four positions or skidded right side up or upside down.

CASH PAYMENT for publication of your good operating ideas. See the notice appearing on p 106.

Portable Steel Containers Store Explosives Safely

THE PROBLEM OF STORING large quantities of explosives on the job with full protection against pilferage has been solved by the Hunkin-Conkey Construction Co. on one of its projects, the extension of the Pennsylvania Turnpike near Pittsburgh. It uses two 275-cu ft 6-ton-capacity welded steel shipping containers originally developed by the Dravo Co., Pittsburgh, for steamship lines. Known as Dravo Transportainers, the weathertight boxes are lined with 1-in sheathing to minimize hazards from sparks and are skid-mounted for easy moving. By using the steel containers, the company has been able to purchase explosives in larger lots and take advantage of quantity discounts that run as high as 35%. The Transportainers also have been found very useful for storage of valuable tools.

Barrel-Type Coupling Guard Fabricated of Expanded Metal



THIS MG-COUPLING GUARD is made in two sections so that the upper half can be easily removed for maintenance.

WITH EVERY ENGINE INSTALLATION, management must at some time decide how best to safeguard personnel working around moving parts, writes P. C. Ziemke, Oak Ridge, Tenn. Some use an extensive arrangement of guard rails made of 1½-in pipe, or even rails made of brass.

An individual-guard type of protection for moving parts, similar to that illustrated, is strongly recommended by Mr. Ziemke. The floor is uncluttered by disfiguring and space-consuming posts and there are no interfering rails to hamper the operator in cleaning and maintaining the premises.

To make this barrel-shaped guard, expanded-metal stock with ¾-in openings was hand-shaped and fastened with rivets to the ¼-in-thick black sheet-iron frame, which also was hand-shaped to conform to the general outline of the mg coupling. Straps of ¼x2-in stock were used to attach the assembly to the bearing hubs at the ac and dc ends.

The guard was built in halves and independently mounted so that only the upper half need be removed for most coupling inspections and tune-ups. Finished with two coats of sprayed-on aluminum paint, the guard not only is not an eyesore, but in fact adds a final touch of permanency to any well-engineered installation and speaks well for management's foresight in safeguarding the plant's heavy equipment, Mr. Ziemke points out.

Automatic Oilers Lubricate Shaft Guides on Shift

LUBRICATION of shaft guides at Maryland No. 2 shaft, Berwind-White Coal Mining Co., Wilmore, Pa., is an automatic operation as the result of an applied idea of Norman Lehman, master mechanic. Mr. Lehman mounted two 7-gal tanks, one for each side, at the top of each cage. A pipe from the bottom of each tank feeds oil to a guide and the cage runners spread the oil on the guide as the cage travels. Valves in the feed pipes control oil flow.

Previously, two men rode the top of the cage and manually applied the oil. Now, the valves are opened, oil flows during four regular trips of the cage, then the valves are closed. It is no longer necessary for men to ride the cage and the guides can be lubricated during working hours. The tanks require filling about once a week.

OIL TANKS mounted on the cage provide automatic guide lubrication during on-shift hoisting.

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Excellent breakage . . . uniform results . . . low cost operation . . . all are yours with AMERICAN Explosives. These dependable explosives come in a wide range of densities and velocities suitable for producing good results.

AMERICAN Explosives have proved their worth through actual use in coal stripping operations through years of service. You can count on them for full effectiveness—*every time*. For prompt delivery, contact any one of several district offices and distributing magazines conveniently located in key areas.

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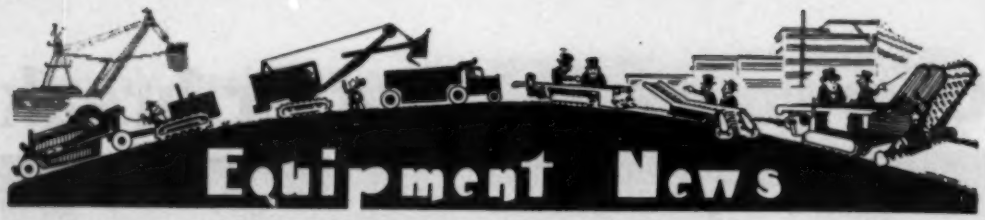

New Shuttle Cars Offer Improved Design (1)

New improved Jeffrey shuttle cars are available in three sizes, in 30-, 36- and 42-in heights, and in a new chassis-type rigid-construction body design said to make for easy loading and discharge. Among the features cited by the maker are: elimination of the hump in center of the car; standardization of discharge conveyor, body and most other equipment to reduce the stock of replacement parts necessary; location of conveyor drive at the pivot point to permit a lighter and smaller discharge end; and Goodyear hydraulic disk-type brakes on each traction unit. The all-electric drive and equipment are placed on the side of the car opposite the operator, with all hydraulic equipment on the driver's side. All units are easily removed for repairs.—*Jeffrey Mfg. Co. Columbus 16, Ohio.*

New-Type Saw Cuts Timber Easily (2)

Utilizing a completely new operating principle, the new Wright Precision power saw will cut heavy timber of any thickness and is as simple, accurate and easy to handle as a handsaw but up to 20 times as fast, the maker says. Fully portable, the saw weighs only 14 lb and operates from any 60-cu ft or larger air compressor. Unlike other-type power saws, the Wright saw drives twin reciprocating blades over a 4-in stroke at 1,500 strokes per min, with a dynamically balanced blade motion that provides full free-swing operation and eliminates thrust or torque during sawing and kick on completion of the cut. The unit is equally effective for crosscutting, ripping and notching and cut width is limited only by the 21-in blade width. Saw blades are readily changed and teeth can be resharpened and set in the same manner as a handsaw, it is said. Sawdust is thrown away from the operator and the saw stops the instant the spring-loaded throttle is released. The unit also has been found to be fully effective in underwater operation. Bulletin gives details.—*Wright Power Saw & Tool Corp., Stratford, Conn.*

1¼-Yd Earth Mover (3)

Model HY, newest addition to the Hough Payloader line of tractor-shovels, has a 1¼-cu yd bucket and is powered by a 60-hp gasoline or diesel engine located at the rear over the drive wheels for maximum tractive effort and capacity. Model HY features powerful bucket crowd and automatic bucket tip-back that prevents spillage, hydraulic power control of bucket-dump and bucket-close, power-boosted steering, and a full-reversing transmission that gives four speeds in each direction up to 29 mph, with an independent, quick-acting reverse control. Digging angle or bucket pitch is quickly adjustable between 1 and 6 deg and the maximum dumping clearance of over 8 ft combined with long reach enables the unit to heap-load big trucks, the maker says.—*The Frank G. Hough Co., Libertyville, Ill.*

Reclosing Relay Adds New Design Features (4)

New GE Type ACR reclosing relay specifically designed for use on automatic-reclosing equipments with all types of power circuit breakers includes, the maker says, the following features not available in previous designs: optional automatic reset at a definite time after any successful reclosure attempt; a self-contained means for permitting instantaneous initial and time-delay subsequent breaker tripping; and faster immediate reclosure. The ACR relay may be adjusted for one, two or three delayed reclosures in addition to the immediate reclosure. Contacts in the ACR make it no longer necessary to use separate auxiliary relays with the reclosing relay to obtain immediate reclosure and to permit "instantaneous initial trip, time-delay subsequent trip" operation. Bulletin GEA-5593 available. — *General Electric Co., Schenectady 5, N. Y.*

Arc Welders Made In Three Sizes (5)

The new 300-, 400- and 500-amp Wilson Bumblebee arc welders, available as indoor or all-weather models, offer instant arc-starting, wide current range, easy-to-operate controls and minimum maintenance, the maker says. Automatic "Hot-Start" control with arc-stabilizing capacitors are provided on the 300- and 400-amp models. Current ranges are 60-375 for the 300-amp model, 80-400 for the

For More Information, Use the Postage-Free Card Facing p 116

Material on Mining Bits

Proper instructions, vitally important to the correct use of carbide tools are available on mining machine bits, coal auger bits, strip bits, and rock bits. They are thorough, time-tested, and reliable. Write Kennametal Inc., Latrobe, Pa., pioneers and world's largest manufacturers of cemented carbide mining tools.

A complete tool catalog is also available that gives specifications, prices, and performance data on Kennametal Mining Tools. Specify M-6. Any of the above material will be sent to you on request.

•

New Bit Rotary Drills Bolt Holes in Laminated Sandstone

Drills hundreds of feet in hard roof

To give the greatest wear resistance in drilling hard roof, the Kennametal HFD Bit is tipped with a thick insert of Kennametal cemented carbide. The bit fits into regular Kennametal Roof Bolting Rods. It is powered by ordinary electric drills. Material drilled with the bit is slate, shale, and laminated sandstone. The four main features of the bit are: (1) Smoother hole without rifling, (2) Longer gage life in hard roof, (3) Easy bit sharpening, (4) Lower bit cost than obtainable with any other bit used for drilling medium hard mine roof. Sizes are 1¼-inch to 2¼-inch, prices range between $4.85 and $14.80, depending upon size and quantity.

•

Machine Bits Bore Rock

Six regular mining machine bits act as cutting teeth in this rigidly constructed bit used for rock boring. The "teeth" are set in a heavy cast steel head. They are secured by set screws which allow them to be removed for sharpening when dulled. Drilling speeds are 3' to 3½' per minute in average drilling. Feature: Ability to drill hard rock formations. Style is UD 6½". The price, including bits, is $45.10 to $59.40 depending upon quantity. *(ADVERTISEMENT)*

Two things make it possible for a bit to achieve a fortieth life. One is its high quality Kennametal tungsten carbide cutting edge and another is the kind of maintenance that is given to it. Poor or improper maintenance is, in most instances, the reason for early fatality. Is your Kennametal Bit changed when it gets dull? Is it reground according to recommended sharpening methods? If not, then a forty-life bit is improbable, and cost sacrifices are made in terms of lower drilling speed, higher drill maintenance cost, higher bit cost.

Under average drilling conditions, where the drilling is largely done in coal with only minor quantities of impurities, the Kennametal Drill Bit can, if properly cared for, give 4,000 feet or more of service or a hundred or more feet of drilling per sharpening. If your performance is less, it may be advisable either to look carefully yourself to be sure the right precautions are being used or better, ask your Kennametal representative to give your procedures a once-over. He knows from daily experience the ways in which bit service can be improved. The way to get maximum life, 40 lives if you're in average coal, is to remove the bit when dull, sharpen it as per the instructions that are prescribed by your Kennametal representative. Kennametal Inc., Latrobe, Pa.

Names and addresses of Kennametal representatives appear in your 1951 McGraw-Hill Mining Catalog.

GRINDING INSTRUCTIONS

For the best service life on your tungsten carbide mining tools, they should be reconditioned at regular intervals and according to proper procedures. Conserve bit life by following proper grinding techniques. Write today for a copy of our complete, fully-illustrated folder on proper bit maintenance.

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Bits for Every Cutting & Drilling Need

400-amp and 100-675 for the 500-amp unit. Silicone insulation permits safe operation at high temperatures without breaking down, is water repellent and also reduces weight to make the units ideal for mounting on portable running gear, according to the company.—*Air Reduction Sales Co., New York 17.*

Conveyor-Control Switch Actuated by Pull Cord (6)

New Schroeder Bros. switch is a pilot-circuit device said by the maker to be quickly operated from either or both directions to control starting or stopping of belt, shaking or chain conveyors. Available in Design MS (open-type) and Design MSP (explosion-tested), the units are installed so that one pull of the cord stops the conveyor. As an added safety factor, two pulls of the cord are required to start a conveyor. Installation of one or more switches connected with the Style PCS plastic-covered steel-centered nylon-filled pull cord permits complete control of a belt conveyor at any point along its full length and is an added protection against roof falls, the maker says. Using the unit on or near the magnetic starter of a shaking or chain conveyor provides a start-stop control from the loading end without extension of an electrical circuit. The Schroeder control has been approved by the USBM as "suitable for use on permissible assemblies." Bulletin available from *Schroeder Bros., Pittsburgh 1.*

105-CFM Air Compressor In Three Mountings (7)

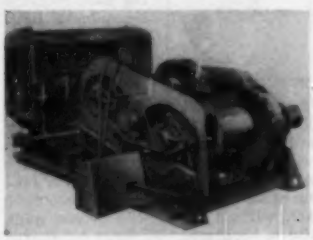
New Gardner-Denver Model WH-105 two-stage portable air compressor is powered by a Hercules QXD-5 6-cylinder gasoline engine and is available on two- or four-wheeled spring-mounted driving gear or on wood skids for truck mounting. Designed and built with economy of operation in mind, Model WH-105 is an all-water-cooled 105 cm unit, which assures cooler air to the tools and thus keeps tool upkeep to a minimum, the maker says. It also features the improved Gardner-Denver unloader pilot, which operates the suction-unloading valves within a fixed range and automatically throttles the engine to idling speed and unloads the compressor. The engine accelerates to full operating speed just prior to the compressor going on load.—*Gardner-Denver Co., Quincy, Ill.*

Job-Designed Visors in Faceshield Line (8)

A new M-S-A line of faceshields, said to offer greater user economy through a choice of specific visors for specific types of hazards, includes the "Chempruf" visor specially built to guard the face, eyes and neck against chemical splash and the "Chipruf" visor designed particularly for protection against light flying particles. Both visors are interchangeable on the standard M-S-A "Headline" headgear, which is preformed to fit the natural contours of the head and is available in three types, with full spark-guard, semi spark-guard and no spark-guard. For extra-large-area protection the M-S-A Super-Gard faceshield is offered with both visor types. Bulletin CN-4 contains full details.—*Mine Safety Appliances Co., Pittsburgh 8, Pa.*

Tractor-Loader Uses New-Type Clutch (9)

Wheel-tractor loader, known as the TL-10 Tracto-Loader, features a single-stage torque-converter drive that furnishes a smooth constant flow of power to the drive wheels, with practically no spinning of wheels while loading and improved crowding action, according to the maker. Another feature is a new-design clutch-type transmission said to eliminate most gear shifting and consisting of separate multiple-disk clutches built into the transmission for forward and reverse speeds, with only one clutch engaged at a time. There is a selection of four forward and four reverse speed ranges. The TL-10 is mounted on rubber tires, has a ¾-cu yd hydraulically-controlled bucket, with ample bucket clearance and reach to load average-size dump trucks, it is said. The unit weighs 10,650 lb and is powered by an Allis-Chalmers 40.5-bhp gasoline engine.—*Tractomotive Corp., Deerfield, Ill.*



Hoist Available With Choice of Power (10)

New Clyde Frame-5 hoist provides a line pull of 8,000 lb, with line speeds up to 279 fpm, and is available with gasoline, diesel or electric power. Features making for easier operation, safe control and power economy, as cited by the manufacturer, include: Clyde-perfected band friction clutches that permit the operator to easily handle full-capacity loads; equalized linkage that provides smooth and even friction engagement and release; outside friction surface affording better heat dissipation; and large-diameter brakes that permit safe and accurate load control by merely "toeing" the brake lever. Bulletin MP-44 offered by *Clyde Iron Works, Inc., Duluth 1, Minn.*

Plug-In Circuit Breaker Protects Two Ways (11)

New plug-in-type Trumbull TOL circuit breaker for 15- to 50-amp service features quick-make quick-

DELEGATION OF RESPONSIBILITY

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To operating executives, plant design and construction represent *extra* responsibilities calling for specialized assistance. Success of the undertaking will depend upon the technical knowledge and experience of those to whom these responsibilities are assigned.

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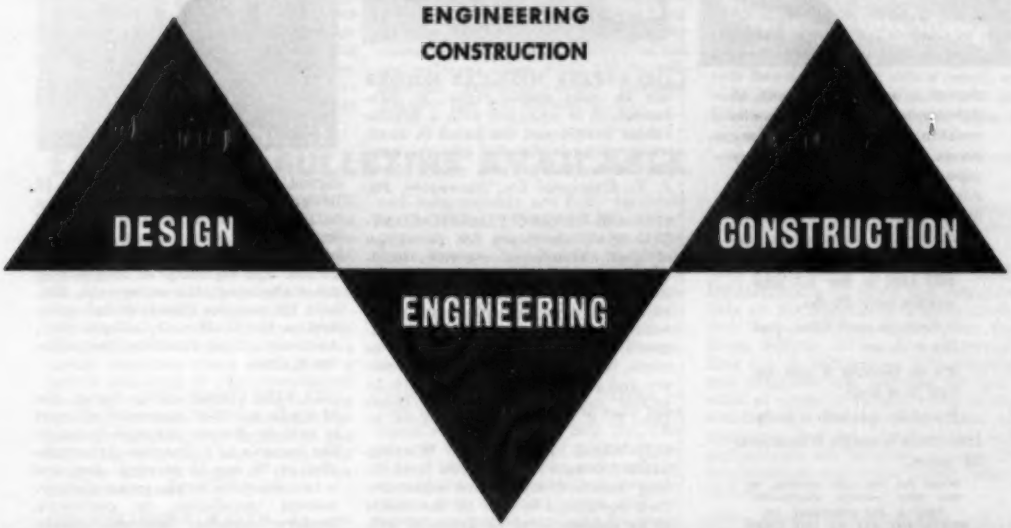

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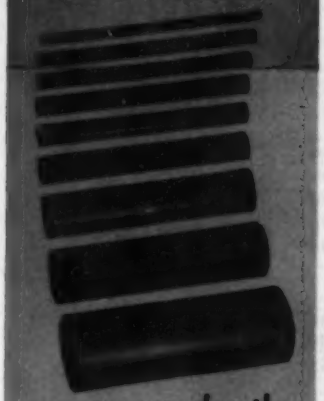

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It finds its own floor—just lay it down

It's so flexible it can be tied in a knot

It can be cut with a knife

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break operation and thermal-magnetic protection for application in a new line of load centers and panelboards. The breaker is tripped by either thermal action of the bi-metal trip-element in response to an overload condition or by magnetic action in case of a short circuit. Contacts are opened and closed with a fast clean action, avoiding excessive burning or arcing of the contacts, the company says. Other features include pressure-type stabs, non-welding silver-alloy contacts and a completely sealed enclosure. Handle extensions are available to provide two-pole operation and breakers of all ampere ratings are physically identical and interchangeable. Bulletin TEB-12 available from *Trumbull Electric Mfg. Co., Plainville, Conn.*

New Electric Motor Has Motor-Mounted Brake (12)

New Sterling Slo-Speed geared-head totally-enclosed fan-cooled motor has a motor-mounted disk-type brake that can be supplied for either stopping or holding service. Both motor and brake are totally enclosed and dust-tight, and the unit is made in ratings ranging from 2 to 15 hp and in AGMA speeds from 280 to 30 rpm. Features listed by the maker include: dual cooling system with an internal fan to circulate air inside the motor and an outer fan to pass air over the streamlined case; labyrinth seals; heavy-duty ball bearings lubricated for life; the Sterling patented herringbone rotor. *Sterling Electric Motors, Inc., Los Angeles, Calif.*

Equipment Shorts You'll Want to Check

(13) SAFETY MINE-CAR HOLDER can be used either right- or left-handed. It is equipped with a flexible rubber handle and the 3x4x8-in hardwood wedge is doweled into the handle. More details and prices from *J. V. Hammond Co., Sprangler, Pa.*

(14) AIR-DRYING PLASTIC COATING newly developed for protection of steel, aluminum, concrete, hardwood or composition board is said by the maker to combine high film flexibility with good adhesion and impact resistance. Known as U. S. Royalguard, the coating will not chip or crack, is available in a variety of colors and is applied by spray, with no primer required.—*Mechanical Goods Div., U. S. Rubber Co., New York 20.*

(15) WORK LAMP—New Westinghouse 100-watt rough-service lamp fitting standard wire-guard extension-cord equipment is said by the maker to be applicable to all types of difficult working conditions because it emits more light from a smaller, more breakage-resistant bulb. The new bulb is 2⅝ in in diameter—¼ in less than the former A-23 bulb—and is made of clear glass or inside-frosted glass in voltage ratings from 115 to 300.—*Lamp Div., Westinghouse Electric Corp., Bloomfield, N. J.*

(16) CLUTCH COUPLING — New Series "E" mercury clutch coupling is a complete unit with provision for mounting a standard flexible coupling between it and the driven load. De-

signed especially for use on shafts of integral-horsepower electric motors up to 15 hp, the new Mercury unit used in conjunction with a flexible coupling provides a satisfactory connection without the necessity of maintaining exact alignment, the maker says. Bulletin 113 contains dimension and specification data.—*Mercury Clutch Div., Automatic Steel Products, Inc., Canton 6, Ohio.*

(17) VIBRATORS—SPO Series No. 82 cradle-mounted pneumatic vibrator is said to deliver powerful hammer-like impacts in a direction either parallel or 90 deg to material flow and is recommended by the maker for permanent installation on conveyors, hoppers, screens, benches, chutes, tables and other equipment. Cast in one piece from high-tensile steel and rapidly attached by four or six bolts, the units are available at present in 1½-in-piston-diameter size. Operating speed is regulated by varying the air-line pressure.—*SPO, Inc., Cleveland 25, Ohio.*

(18) PROTECTIVE COATING—du Pont Neoprene can now be applied as an airdry protective coating for structural steel, concrete, wood and exterior surfaces of tanks and equipment. Applied by brush or spray gun

in a single coat of 5 to 10 mils thickness, the new product features exceptional resistance to oil, grease and chemicals, and resistance to age-cracking by sunlight, weather and ozone, the maker says. It also possesses the characteristic properties of any rubber product—resilience, elasticity, high abrasion resistance, non-chipping and non-cracking. Known as Gaco Neoprene maintenance coating, the new material is produced by *Gates Engineering Co., Wilmington, Del.*

(19) PLASTIC-PIPE REDUCERS AND END PLUGS—New line of injection-molded plastic reducing bushings and end plugs now are available for use with Carlon plastic pipe. The reducing bushings can be used to join sections of plastic pipe or to connect Carlon plastic lines with previously installed metallic systems and are available in 15 sizes from 2x1½ in down to ¾x½ in. Pipe plugs are obtainable in 6 sizes from 2 to ½-in. Only one reducer bushing is required to reduce any pipe diameter to any other standard size the maker says.—*Carlon Products Corp., Cleveland 5, Ohio.*

(20) MAGNETIC RELAYS — New Bulletin 401 AC voltage sensitive relays-power type are intended for use in ac circuits where a close voltage differential between relay pick-up and drop-out is needed, the maker says. A typical application cited is protection of ac motors up to 2 hp against damage caused by low line voltages and other uses include power and lighting bus transfer and in some cases over-voltage protection. Nominal coil voltages range from 115 to 440. Bulletin available.—*Ward Leonard Electric Co., Mt. Vernon, N. Y.*

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Please send me catalogs or further information about the items from the Equipment News Section whose numbers are circled. (Apr., 1951)

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(21) IF YOU COULD USE A QUICK GUIDE to eye-hazardous occupations and the recommended eye protection for specific industrial eye hazards, circle No. 21 on the postage-free card for the new, revised issue of the "AO Eye Safety Guide" prepared by American Optical Co., Southbridge, Mass. Completely illustrated, the guide is a useful reference chart containing a careful summary of recommendations made by the AO Safety Engineering Service Bureau for eye-hazardous jobs throughout many industries and indicating where eye hazards are most common and the types of protective devices necessary.

(22) RETAINING WALLS—An economical solution to embankment stabilization is offered in a new manual published by Armco Drainage & Metal Products, Inc., Middletown, Ohio. The 16-p illustrated booklet, "Armco Bin-Type Retaining Walls," not only describes how the walls are used but shows how strength plus flexibility is incorporated in their design. Installation methods, technical data on selection of design and the units required for various types of sections, and sketches showing typical applications are included.

(23) REBUILDING AND REPAIRING WORN DIPPER TEETH quickly and inexpensively are fully described in the latest "Manganal Marketer" (Vol. 2, No. 9), available from the Stulz-Sickles Co., Newark 5, N. J. Pertinent facts about where and how to use Manganal 11% to 13½% manganese-nickel-steel products to salvage worn dipper teeth are presented in detail with accompanying illustrations.

(24-28) SHAKER CONVEYORS — Five bulletins listed below have been issued by the Goodman Mfg. Co., Chicago 9, to provide you with full details of the construction and performance of Goodman Duckbill shaker conveyors and the head, drive and accessory equipment available for them. Included are operating features, illustrations of typical installations and drawings of typical mine layouts, etc. Order by number on the postage-free card as follows:

(24) Duckbill shaker conveyor, overall description (Goodman Bulletin CC-505).

(25) Type G shaker-conveyor drives (Bulletin CC-506).

(26) Type Ell shaker-conveyor drive (Bulletin CC-507).

(27) Goodman automatic Duckbill (Bulletin CC-508).

(28) Accessories and complementary equipment for use on Goodman shaker conveyors (Bulletin CC-509).

(29) STRIPPING SHOVELS AND DRAGLINES—If you'd like complete data on the Bucyrus-Erie units available for coal stripping, request the 30-pg Bulletin STR-1 from Bucyrus-Erie Co., S. Milwaukee, Wis. Shovels and draglines are pictured in operation at mines in various parts of the country and detailed discussions of operating features, construction and performance are included, along with specifications and other useful information.

(30) CONTINUOUS-MINING MACHINE—Bulletin 834 from the Jeffrey Mfg. Co., Columbus 16, Ohio, describes how the Colmol works, covers construction and operating features, and offers detailed data on sizes and models available.

(31-32) TRUCKS—The Euclid Road Machinery Co., Cleveland 17, Ohio, has published two new 16-p booklets covering Cummins- and General Motors-powered Euclid equipment. They list by model number the various diesel engines and the Euclid equipment in which they are available and include specifications for Euclid rear-dump and bottom-dump hauling units,

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scrapers and loaders. Circle No. 31 on the postage-free card for a copy of Form EGM-1 covering General Motors and No. 32 for a copy of ECE-10 on Cummins-powered Euclids.

(33) FLEXIBLE COUPLINGS — Folder 2363 on Link-Belt "RC" roller-chain flexible shaft couplings recently issued by Link-Belt Co., Chicago 1, offers engineering information required for proper application, including dimensions, weights, service factors and horsepower ratings. Detailed data are also given on two types of protective grease-retaining casings—Style R (spun-metal revolving-type) and Style P (plastic revolving-type).

(34) HYDRAULIC PULLERS AND JACKS and their labor-saving applications are discussed in a new bulletin, "Hydraulic 51," issued by Templeton, Kenly & Co., Chicago 44. The bulletin also introduces Simplex Re-Mo-Trol hydraulic pumps and remote-controlled rams, illustrating how these units simplify rigging requirements and improve safety in numerous operations. It offers complete specifications of Re-Mo-Trol units and all other Simplex hydraulic jacks and jennies.

(35) CLEANING MINUS ¼-IN COAL with the Humphreys spiral concentrator is described in a reprint of a paper presented at the 1950 International Conference on Coal Preparation held in France. It thoroughly covers design of the unit, operation, results and costs. Available as Bulletin 12 from the Humphreys Investment Co., Denver 2, Colo.

(36) MINE SUPPLIES AND MACHINERY—Catalog 50 from J. V. Hammond Co., Spangler, Pa., offers descriptions, illustrations and prices of various mine supplies, such as explosive boxes, tamping poles, blasting units, trolley poles, brake blocks, rope pullers, mine-car sprags, wooden roof pins or bolts, and machine-shop tools.

(37) COUPLINGS—Construction and operating features, installation and specification data on Falk Type P piloted-type couplings are contained in Bulletin 4115. Similar information on the Controlled-Torque coupling is featured in Bulletin 4130. Available from Falk Corp., Milwaukee 8, Wis.

(38) COAL-HANDLING MACHINERY—Handy pocket-size catalog fully covers the design, application and specifications of the wide range of Sturtevant equipment for crushing, grinding, separating, elevating, conveying and mixing. The booklet combines data heretofore available only in a number of separate bulletins.—Sturtevant Mill Co., Boston 22.

(39) TO HELP WITH PIPING PROBLEMS OR APPLICATIONS, dimensions on welding fittings and flanges that could otherwise be found only by searching through many catalog pages and tables have been condensed and reproduced on two sides of an 8½x11-in card by Taylor Forge & Pipe Works, Chicago 90. One side covers the broad WeldELL line of Taylor Forge welding fittings and shows wall thickness and essential dimensions for nominal pipe sizes from ⅛ through 30 in. The other side covers forged steel flanges, with data for sizes from ⅛ through 24 in.

(40) DIESEL ENGINES — Catalog describing its complete line of Series 71 2-cycle diesel engines for various applications is available from Detroit Diesel Engine Div., General Motors Corp., Detroit 28, Mich. The book covers single- and multiple-engine units from 2 to 24 cylinders with horsepower ranging from 32 continuous to 780 intermittent, and contains a "Select Your Power" chart covering 57 standard power-take-off and 7 torque-converter models.

(41) AUTOMATIC ARTIFICIAL RESPIRATION—The M-S-A Pneolator, which now permits automatic artificial respiration without suction, is described in a Bulletin CH-2 published by the Mine Safety Appliances Co., Pittsburgh 8. Weighing only 47 lb complete, the recently introduced Pneolator uses intermittent positive pressure to provide safe, uniform lung ventilation in cases of respiratory failure.

(42) LABORATORY CRUSHERS — Bulletin issued by American Pulverizer Co., St. Louis 10, Mo., discusses features and application of its line of small, high-capacity crushers, said by the maker to be particularly adaptable to efficient coal sampling. Detailed design and specification data are included.

(43) IMPROVED DUST CONTROL WITH WATER—Application and results of "Wet Water" for dust control in mines using the Aquadyne capsule and Hydro-blender, are described in bulletin available from the Aquadyne Corp., New York 17.

(44) JACK LINE covered by new 16-p Catalog 1515 released by the Buda Co., Harvey, Ill., includes a complete range of ratchet, screw and hydraulic jacks in capacities from 3 to 75 tons. The bulletin features a special table to help select the correct jack, application pictures, recommended uses for jacks, special features and detailed specifications.

(45) ROCK DRILLS — Bulletin H-1200-B42 describing Worthington's light- and medium-weight WJ-45 and WJ-55 hand-held all-purpose rock drills is available from Worthington Pump & Machinery Corp., Harrison, N. J.

(46) COAL CRUSHERS—Bulletin describing special features (including the Rolling Ring Crushing principle of which American is the originator), capacity, speed, and construction and applications of "AC" series crushers for the production of domestic-stoker sizes is available from American Pulverizer Co., St. Louis 10, Mo.

(47) ELECTRODES—Detailed data on All-State welding, brazing, soldering, cutting and tinning alloys and fluxes, organized to facilitate selection of materials that meet requirements most exactly, are contained in a new folder available from All-State Welding Alloys Co., Inc., White Plains, N. Y.

(48) GRAPHITE PRODUCTS—Users of natural graphite and graphite products will profit from a technical-data booklet made available by the Joseph Dixon Crucible Co., Jersey City 3, N. J. The 23-p booklet covers the history, sources of supply and characteristics of various graphites, specific properties, recommendations for use and general information on products made from or with natural graphite.

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UNITED STATES STEEL

Armed Forces Urged to Use Coal Over Oil and Gas

The use of coal at all military installations and military-sponsored facilities was recommended to the Army, Navy and Air Force by the Munitions Board in a memorandum on the present availability of fuels made public last month. Dated Feb. 17 and addressed to the secretaries of the three services, the memorandum stated that wherever possible first preference should be given to coal, second to natural gas and third to oil.

For "maximum support to the overall defense effort, and to reduce the possibility of fuel-procurement difficulties, it is necessary that fuel use be carefully reviewed, particularly for areas of limited fuel resources and for installations of large fuel consumption," the board explained. "The relative availability of various kinds of fuel will change as mobilization and defense production is stepped up. Shortages of some fuels have already developed in some localities," it pointed out.

In discussing its preference for coal, the board said: "Coal is the Nation's largest fuel resource. It is available quite generally, except in West Coast states. It should be employed, as far as practicable, at all military facilities—both command and industrial, as well as military-sponsored industrial facilities. Mine production in general is expected to meet over-all requirements, but in some areas there will be difficulty in obtaining deliveries due to a shortage of coal cars. For this reason consideration should be given to obtaining requirements from the nearest mines even though quality is not up to that desired in normal times. Assurance of fuel supply and adjustment to defense needs should be basic guides in determining the fuel to be used."

Installations with multiple-fuel equipment should use that fuel most readily available under the present emergency conditions, the board said, and in areas where the fuel situation makes it necessary, conversion of burning equipment should be considered. The board laid down no general rule, however, but said that a decision on conversion should be based on the amount of fuel involved, critical materials and manpower required, local conditions, etc. For both multiple-fuel equipment and possible conversions, it stated its fuel preference as coal, gas and oil, in that order.

Featured in This Section

Personnel Notes	p 122
High-Capacity Strip Dredges	p 124
Obituaries	p 126
AIME Coal Division Report	p 128
BCR Annual Meeting	p 130
News in Brief	p 132
New Mine Developments	p 134
Among the Manufacturers	p 136
Association Activities	p 160
New Books for Coal Men	p 160
Preparation Facilities	p 162
Foreign Developments	p 164

As second choice for military installations, "wherever use of coal is impracticable, gas should be considered, although it will be necessary to make sure that its availability will continue for a reasonable period of time," the board said. While fuel oil has been abundant the past 2 yr, under the stepped-up defense program the situation is changing and consequently "the use of heating oil and fuel oil should be kept to the practical minimum," it maintained. It also recommended minimum use of liquefied petroleum gases.

W. Va. Fireboss Bill Signed; Probe Ends

The highly controversial "fireboss bill" permitting section foremen to also serve as firebosses in West Virginia coal mines was signed into law by Gov. Patterson March 2. Approval of the bill climaxed several years of UMWA opposition to the practice, which culminated in a series of protest stoppages in mines in the state as the bill neared passage late in February (*Coal Age*, March, p. 128).

Later, on March 8, the house committee that had been investigating the state Department of Mines issued a report clearing Arch J. Alexander, chief of the department, and other employees of the department of charges that they were financially interested in coal mines in the state. The committee recommended that legislation be passed to prevent employment in the mines department of any man whose wife had interests in mining operations. During the hearings, several mine inspectors reported that their wives had such holdings.

Railroads Authorized 2% Freight-Rate Boost

The Interstate Commerce Commission March 14 authorized the nation's railroads after 15 days to put in effect a temporary freight-rate increase of 2%. The maximum change in rates on coal and coke is held to 6c a net ton, or 7c a gross ton, by the ICC order. It permitted eastern railroads to add 4% to their rates, but with the same maximum on coal and coke. A few days later, the railroads said that they would seek an increase of 15% over existing rates, ranging from 18 to 50c a net ton.

In permitting the boost, the ICC indicated that it was basing its decision on the higher costs resulting from higher wages agreed on by the non-operating employees and the railroads. The railroads in January had asked for a 6% hike on an emergency basis, but the commission maintained that they had not justified such a boost if the added wages of non-operating employees were not considered. Further hearings will be held to determine the amount of a permanent increase.

Violence Flares in W. Va. and Pa. Fields

All but two of the 60 pickets accused of violence during the union drive on non-union mines in Preston County, W. Va., remained silent in the Kingwood circuit court March 15 when invited to plead to indictments returned by a special grand jury impaneled the week before. A further hearing was set for March 28 when the UMWA attorney representing the men indicated that he would challenge each of the indictments.

The charges stem from a series of incidents in the 2-mo organizing drive that dates back to Jan. 23, when roving pickets closed down several small non-union mines in the area. Trucks were overturned, workers stoned and shooting occurred in some places, it was reported.

In Kingwood, some 60 businessmen and civic leaders met March 2 to form a "citizens' committee" to seek a peaceful solution to the continuing disturbances. The following day Circuit Judge Charles P. Wilhelm acted on one of the committee's recommendations and called a special grand jury to probe the situation. Later, Judge Wilhelm set March 17 for a hearing on a request by 17 non-union coal companies and 25 employees to issue

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HARRY C. WALTER, personnel manager and editor of The Lorain-Lorado Journal, monthly magazine for employees.

Coal-Company President and Employee Magazine Honored for Contribution to Cause of Freedom

Stanley B. Johnson, president of The Lorain Coal & Dock Co. and The Lorado Coal Mining Co., and *The Lorain-Lorado Journal*, monthly employees magazine of both companies, recently received Freedoms Foundation Awards for outstanding achievement in bringing about a better understanding of the American way of life during 1950.

Mr. Johnson received a fourth-place award in the editorial category for his President's Corner, "Faith of Our Fathers," which appeared in the January, 1950, issue of *The Lorain-Lorado Journal*. The publication, edited by Harry C. Walter, personnel manager, received the second highest award in the company employee publications category.

Freedoms Foundation is a non-profit, non-political organization chartered in 1949 for the specific purpose of making annual awards of cash and medals to Americans who make outstanding contributions to a better understanding of freedom by the things they do, write or say. Its board of directors is composed of distinguished citizens in various positions throughout the country. More than 800 individuals and organizations were cited to receive its $100,000 Awards for their 1950 contributions. Presentation of the top awards was made by Gen. Omar N. Bradley.

The Lorain-Lorado Journal, published in the interest of the employees of both companies, was instituted in June, 1943, to keep employees in the armed forces posted on happenings at the mines and in their own communities, and to keep them in touch with each other. The popularity of *The Journal* grew with each issue and when World War II hostilities ceased it had become an important and permanent part of the company's employees' relations program and has been published regularly since then.

Although *The Journal* is published for employees, many others have found it interesting and have asked to receive it regularly. Copies are mailed each month to 11 foreign countries, 28 states and the District of Columbia. Included are customers, shareholders, labor organizations, coal associations, other mining companies, local, state and federal government officials, mining schools, related industries and others.

The year 1950 also marked the completion of half a century in the coal mining industry for The Lorain Coal & Dock Co., whose general offices are at 33 North High St., Columbus, Ohio. Sales offices are in the Terminal Tower, Cleveland, Ohio; and mining operations in Blaine, Belmont County, Ohio, and Lorado, Logan County, W. Va.

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an order that would restrain the UMWA and 58 pickets from attacking and intimidating employees, causing property damage and otherwise interfering with operation of the mines. Named in the petition were the president and other officers of UMWA District 31.

George B. Hudson, mine foreman for the Industrial Coal Co., Kingwood, was arrested March 17 in connection with a killing of one man and wounding of two others at his home near Clay, W. Va., some 200 mi from Kingwood, it was reported. Mr. Hudson was said to have told police that the shooting occurred after the three Preston County men came to his home where he was visiting for the weekend and threatened him and his family.

In Pennsylvania, dynamiting destroyed one tipple and damaged another at the strip mine of the Sherman Bros. Construction Co., near Brookville, Butler County, it was reported March 4. An active UMWA drive on non-union strip mines was centering in Butler and Beaver Counties at the beginning of the month and was expected to spread into Mercer County shortly. UMWA pickets reportedly complained to state police that 30 to 40 shots were fired at them when they went to one property near Butler.

Settlement of a month-long shutdown of the Hawthorne Coke & Fuel Corp., near Norton, Va., was reported March 16 with the signing of an agreement with UMWA District 28. The company obtained a court order Feb. 28 limiting pickets to 14, half the number of its total employees, after 75 to 500 men had picketed the property. On March 1, the Hawthorne Coke & Fuel Corp. and Vigo Coals, Inc., filed separate suits of $300,000 each against the UMWA and its District 28 for damages reportedly resulting from shutdowns of their properties.

In Alabama, the Taylor & Lee Coal Co., operators of a Walker County strip mine, March 1 sued the UMWA and District 20 for $500,000 damages suffered during the 1950 strike. The union, through its members and agents, attempted to close down the mine, the company said, and a loader, stripper and tractor were destroyed by dynamite and other equipment damaged.

Annual NCA Convention Open to All Coal Men

All coal men, whether associated with NCA member or non-member companies, are welcome and are urged to attend its annual convention, officials of the National Coal Association emphasize, in reporting plans for the meeting to be held at the Waldorf-Astoria Hotel, New York City, April 19-20. A free and full discussion of industry problems is a primary objective of the program.

While the final schedule has not yet been released, the 2-day session will include talks by top NCA officials; meetings and reports of the safety, membership, air-purification and other active NCA committees; and comprehensive reviews of the work of Bituminous Coal Institute and Coal Heating Service.

NEWS OF YOUR ORGANIZATION is also interesting to others, so why not make it a point to inform COAL AGE of personnel changes among your staff members, mine-development plans and unusual company activities.

Personal Notes

James S. Laird has been named general superintendent of the Gay Coal & Coke Co. and Gay Mining Co., Mt. Gay, W. Va., according to an announcement by Harry S. Gay, vice president and general manager. A graduate of VPI, Mr. Laird has been assistant to the general manager of the Gay companies for the past 2 yr. Prior to joining the organization, he was an industrial engineer for the Island Creek Coal Co. and previously had served in various supervisory capacities with EG&FA. During the war, Mr. Laird was in service for 5 yr, with 3 yr in the Pacific Theatre, and was discharged as a major.

H. B. Jones has been appointed general manager of the Imperial Smokeless Coal Co., Quinwood, W. Va., C. E. Hough, vice president of the company, has announced. Previous to his new appointment, Mr. Jones was superintendent of the Garden Ground mine of The New River Co., Mt. Hope, W. Va. A mining engineering graduate of West Virginia University, Mr. Jones had been associated with The New River Co. for the past 17 yr.

W. J. Parton last month was named general manager, and **Norman Richards** was advanced to general superintendent of the Lehigh Navigation Coal Co., Lansford, Pa., effective March 16. Mr. Parton, who has served as assistant to the general manager since January, 1948, succeeds **D. C. Helms**, whose election as vice president was announced in February. A graduate of Penn State College, Mr. Parton was a research fellow with the USBM in Seattle, Wash., previous to joining Lehigh Navigation as a junior engineer. Following experience as a preparation engineer, supervisor of flotation projects for the company and production-planning engineer, Mr. Parton was made superintendent of the Nesquehoning-colliery district in May, 1947. Mr. Richards started to work at the age of 12 as a water boy for the Lehigh & New England R.R., becoming a slate picker for the coal company in 1917. Following his appointment as a fireboss in 1930, Mr. Richards held various supervisory positions throughout the company and was named superintendent of the Coaldale district in 1946, the post he held when appointed to his new post.

E. H. Snow Jr., superintendent of EG&FA's Carswell mine, has been named general superintendent of the company's Pocahontas group of mines of the Low-Volatile Div., succeeding **S. H. Thatcher**, recently appointed assistant to the labor relations manager. **D. B. Shupe**, resident engineer at Carswell, succeeds Mr. Snow as superintendent of that operation. **J. B. Link Jr.**, who has replaced Mr. Shupe as resident engineer at Carswell, has been succeeded as resident engineer at Maitland mine by **Guy Wilson**, formerly transitman at Eccles mine. **W. W. Mabe**, formerly resident engineer at Wharton No. 1 mine, has been appointed to a similar position at Stotesbury No. 8, replacing **J. D. Kalasky**, who has been transferred to the Pittsburgh office. **Ralph Snyder**, transitman at Keystone mine, has succeeded Mr. Mabe at Wharton No. 1.

George R. Watkins has been named assistant to the vice president and general manager, U. S. Fuel Co., Salt Lake City, Utah, according to an announcement by S. J. Craighead, vice president and general manager. **Richard S. Ludwig** succeeds him as mechanical engineer. Mr. Watkins joined the company in 1920 while an engineering student at the University of Utah and served in an engineering capacity at operations in Carbon and Emery Counties. He was employed by the U. S. Smelting, Refining & Mining Co. from 1925 until 1948, when he returned to the U. S. Fuel Co. He was made mechanical engineer a year ago. A graduate of the University of Washington, Mr. Ludwig was em-

Heads W. Va. Coal & Coke

THERON G. GEROW, executive vice president of the Truax-Traer Coal Co., has been elected president of the West Virginia Coal & Coke Corp., succeeding Charles Dorrance, who will retire under the company's retirement plan at its annual meeting April 18. Mr. Gerow, associated with Truax-Traer since 1927, was made chief engineer in 1935. He was elected a vice president in 1941 and became executive vice president in 1947. Mr. Dorrance, who will continue as a director and a member of the company's executive committee, left his position of vice president and general manager of operations for Consolidation Coal Co. in 1939 to become president of West Virginia Coal & Coke. Mr. Dorrance joined Lehigh Coal & Navigation Co. in 1907 on graduation from Lehigh University, and for a number of years afterward held supervisory and executive positions with several anthracite companies.

P&R Official Retires After 70 Yr in Mining

SEVENTY YEARS' SERVICE to his company was the record of Nicholas F. Hoffman, Coles, Pa., when he retired March 1 as master mechanic of Mahanoy City colliery, Philadelphia & Reading Coal & Iron Co., Pottsville, Pa. Born Dec. 24, 1870, in Tamaqua, Mr. Hoffman at the age of 10 began working for P&R as a slate picker in the breaker of Tunnel Ridge colliery. He advanced to successive jobs as pump runner, repairman and machinist at Tunnel Ridge, Maple Hill and Ellangowan collieries until 1936, when he was promoted to master mechanic at Mahanoy City, the position he held at retirement.

Recounting Mr. Hoffman's 70-yr continuous-service record, T. V. Monahan, superintendent, Mahanoy City division, stated that Mr. Hoffman had no lost-time injuries, an excellent attendance record and a reputation for high integrity in the performance of his duties. At his retirement, Mr. Hoffman was the company's oldest employee, in both age and length of service.

NICHOLAS F. HOFFMAN (left) is congratulated on seven decades of company service by T. V. Monahan, P&R division superintendent.

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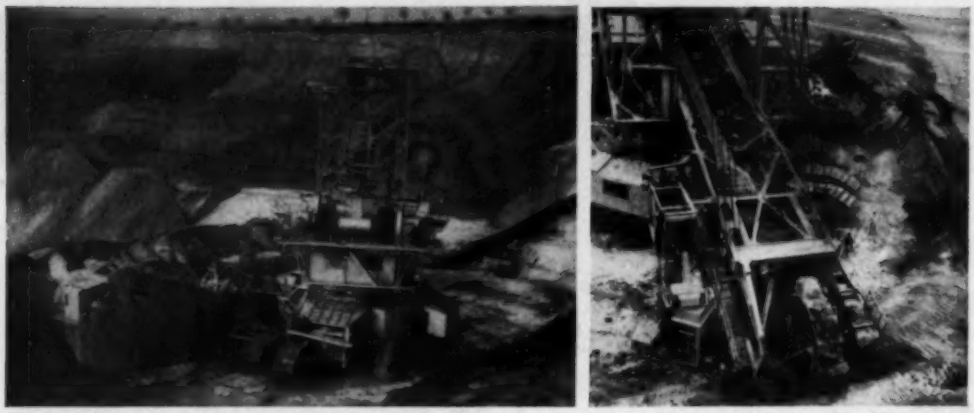

GERMAN WHEEL EXCAVATOR, shown on its way through sand hills to the coal pit, handles about 850 cu yd of material an hour. Elevators extending from the center of the unit to deposit earth and coal can be moved independently of the excavator wheel (right). The machine is 240 ft long and 105 ft high and uses 40 electric motors. (Wide World photos)

ECONOMIC MINING of the large scale deposits of low-rank brown coal (lignite) in Germany and Australia has led to the development of the high-capacity special stripping and coal-loading units shown in the photos above and on the opposite page.

The German unit (above) is a 1,100-ton blade-wheel excavator built for the open-pit brown-coal mines near Helmstedt by Luebeck Maschinebau Gesellschaft. The excavating wheels dig about 850 cu yd of coal or overburden per hour. A revolving stacking conveyor is used for disposing of overburden or loading of coal into trucks. The machine is about 240 ft long and 105 ft high and is driven by 40 electric motors with a capacity of 1 million watts. Started about a year ago, the unit could not be set up in the pit for technical reasons and had to work itself through sand hills before it could begin coal loading (left photo, above).

In the Yallourn field of Australia (opposite page), some 40 ft of sand and clay is being stripped to uncover a 200-ft seam of coal, which is hauled by rail to the principal power station and briquetting plant of the State Electricity Commission of Victoria. The deposit measures 40 sq mi and is estimated to contain 6,000 million tons of brown coal.

One of the three bucket dredges is shown loading coal in the upper left photo. Overburden is conveyed by electric railway in special side-tipping cars for disposal in the worked-out section of the open cut (upper right photo). The new overburden dredger imported from Germany shown under construction (lower right) is a bucket-chain revolving unit capable of excavating 1,000 cu yd of material per hour. It operates from rail tracks and can work from either above or below its track level. The new unit, which was expected to begin operation early this year, is about five times the size of an earlier-type German overburden dredger in use in the pit.

To meet critical shortages of fuel and power that seriously threaten industrial development of the country, operations at Yallourn are to be sharply expanded in the next several years. The present 175,000-kw capacity of the power station is to be upped to 331,000 kw by 1956, with further extensions now planned to boost it to 500,000 kw. A new briquetting project now under construction at Morwell, 6 mi from Yallourn, will consist of four plants, each with an annual output of 650,000 tons. The 1949 coal production from the field was nearly 6½ million tons. Of this, 4 million tons went to the power station, with the remainder used for the manufacture of briquets. By 1956, coal production will rise to 10 million tons yearly, and plans also call for eventually pushing Victoria's output of briquets to more than five times the present yearly production rate.

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ployed at the Nome operations of the U. S. Smelting, Refining & Mining Co. from 1934 to 1943 and was transferred to the company's engineering department in 1949.

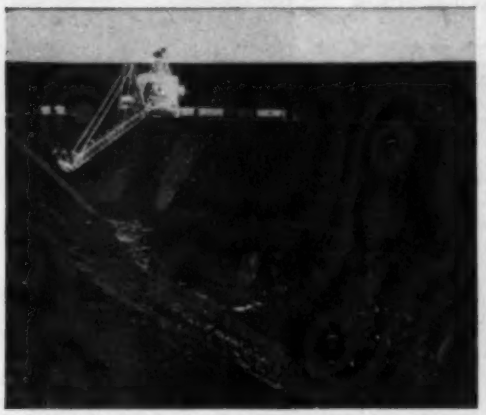
Edwin McGraw, assistant safety director and head of the personnel department of the West Kentucky Coal Co., Madisonville, Ky., last month was appointed superintendent of the company's new Atkinson mine now under development. **A. O. DeMoss**, formerly senior mine inspector in the area for the Kentucky Department of Mines and Minerals, has been named assistant safety director, succeeding Mr. McGraw. **Aurie Powell**, who has been assistant to Mr. McGraw in the personnel department, has been advanced to head that department. **James Phalan** now is senior state mine inspector in Western Kentucky, with headquarters in Madisonville.

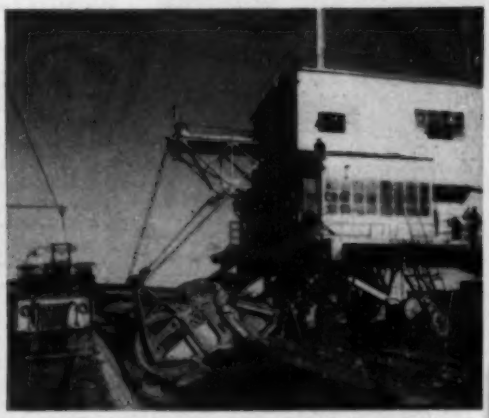
Fred Schrameck has been appointed mine manager of the Livingston No. 1 mine of the Livingston-Mt. Olive Coal Co., Livingston, Ill.

Fred K. Prosser, general coal traffic manager, Norfolk & Western Ry., has been named a part-time consultant to the Defense Solid Fuels Administrator. During part of the last war, Mr. Prosser served as Assistant Deputy Solid Fuels Administrator for War, handling the distribution and transportation of coal. Two other appointments in the DSFA also were announced early last month. **Donald E. McBrien** was made assistant director of the coke division and **Harold J. Sloman** was named coal and coke specialist in the finance division.

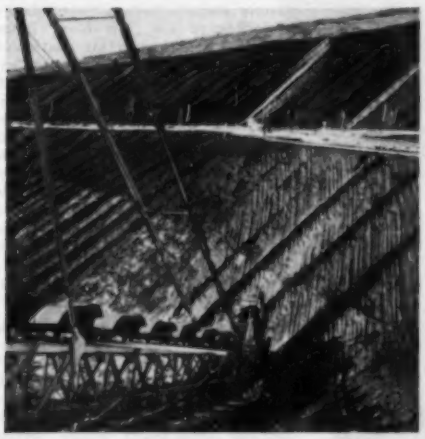
Strip Foreign Lignite

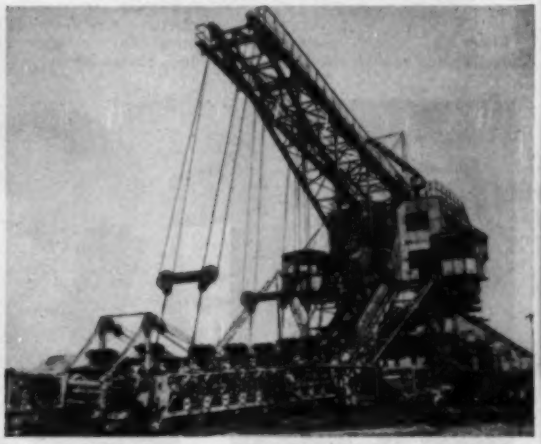
Australia: Bucket Dredge—1,000 Yd Per Hr





AUSTRALIAN BUCKET DREDGE loads a 200-ft seam of brown coal used at the Victoria state power station and briquet plant. Overburden is hauled in special side-tipping cars to a separate disposal unit (right) for stacking in worked-out pits. The field is 40 sq mi in area and contains an estimated 6,000 million tons. Rapid expansion of the power and briquetting facilities is being planned.





ENDLESS BUCKET CHAIN (left) on one of the Yallourn Coal dredges. At right under construction is a new German bucket-chain overburden dredger that will be capable of handling 1,000 yd of material an hr.

Oscar Steckman, superintendent of the Ocean mine of the Pittsburgh Coal Co., retired at the end of January. Friends and associates honored Mr. Steckman at a dinner given in February and presented him with a motion picture camera and projector. Mr. Steckman joined the company in 1904 and was made superintendent of Banning No. 1 in 1918, moving to the Ocean mine in 1939.

W. A. Borries, formerly general manager, has been elected vice president in charge of operations of the Dawson Daylight Coal Co., Dawson Springs, Ky. Mr. Borries is president and general manager of the company's affiliate, Dawson Collieries, Inc. **W. A. Morris** and **P. W. Lynch**, Dawson Springs, have been elected directors of the Dawson Coal Co. and Mr. Morris has been named a director of Dawson Collieries, Inc. **Bayne Keller** has been made cashier of all the affiliated companies.

John L. Romine has been appointed Illinois State mine inspector for the 15th district, consisting of Franklin and Perry Counties, succeeding the late **John D. Kinstler**. Employed in Illinois coal mines for 24 yr, Mr. Romine for the last 15 yr has been a faceboss at Mine No. 8, Old Ben Coal Corp., West Frankfort.

L. F. Reinartz, formerly assistant vice president, has been elected a vice president of the Armco Steel Corp. In his new post, Mr. Reinartz will be in charge of special operating development for Armco and its affiliated companies and also will remain in charge of the company's coal-mine.

operations. **Opal Kane**, formerly general superintendent, has been named manager of the Armco Mining Div., and **J. S. Chapman** has been made assistant to the manager, continuing in charge of personnel relations for the division. Mr. Kane joined Armco in 1943 as a general foreman and was made a mine superintendent in 1945. In 1948 he was advanced to production supervisor for the division and was named general superintendent in 1949. Mr. Chapman, who joined the company as a tipple foreman in 1937, was promoted to traffic manager in 1943 and in 1946 was placed in charge of employee relations.

T. Reed Scollon has been appointed a consultant to organize and direct the bituminous coal section of the Solid Fuels Branch of the Office of Price Stabilization, Washington, D.C. Mr. Scollon will continue to serve the Central Pennsylvania Coal Producers' Association as a field engineer and director of research and statistics, a post he has held for several years.

Walter J. Howard, Chillum, Md., has been appointed director of the transportation division of the Defense Solid Fuels Administration.

John L. G. Weysser, Lansford, Pa., has been named a materials and equipment consultant to the DSFA.

Elmer J. Boer, associated with Battelle Memorial Institute for the past 6 yr., has joined the engineering staff of Bituminous Coal Research, Inc., where he will work on heat and power generation for commercial, small industrial and electrical-utility coal markets.

Bertam D. Coleman has been elected a vice president of the Ebensburg Coal Co., and Coleman & Co., Inc., Philadelphia.

MEETINGS

- National Coal Association: annual meeting, April 19-20, Waldorf-Astoria Hotel, New York City.
- Ninth Annual Anthracite Conference: May 4, Lehigh University, Bethlehem, Pa.
- American Mining Congress: coal convention and exposition, May 14-17, Public Auditorium, Cleveland.
- Mine Inspectors' Institute of America: 41st annual convention, June 4-6, Phoenix Hotel, Lexington, Ky. For information, write C. A. McDowell, secretary, 427 Park St., California, Pa.
- Rocky Mountain Coal Mining Institute: annual meeting, June 7-9, Hotel Utah, Salt Lake City, Utah.
- Stoker Manufacturers' Association: annual meeting, June 25-26, South Shore Inn, Lake Wawasee, Syracuse, Ind.

Operating Officials in Lorain-Lorado Advisory Posts

L. F. WORKMAN (LEFT) AND E. G. SCHELL, general managers of mines for The Lorado Coal Mining Co. and The Lorain Coal & Dock Co., respectively, have been named advisory members of the Junior Executive Committee of The Lorain Coal & Dock Co. by S. B. Johnson, president of the two organizations. Set up to help coordinate the functions of the various departments and assist their smooth operation, the Junior Executive Committee is composed of William H. Barrett, executive assistant to the president; Stanley B. Johnson Jr., operating assistant to the president; Frank A. Burke, sales manager; Robert L. Crow, assistant sales manager; Dix O. Reeves, general auditor; and Harry C. Walter, personnel manager. Both Messrs. Schell and Workman, who have held their present posts since June 1, 1946, began working around the mines in their teens and have had long experience as supervisory officials. Mr. Workman first was employed by the company in 1916 at the age of 18 as a tipple worker. Mr. Schell joined the company in 1937 as superintendent of its Stanley mine.

Obituaries

Robert H. Morris

Robert H. Morris, 73, vice president of the Gauley Mountain Coal Co., Ansted, W. Va., died March 1 in Charleston, W. Va. Long active in coal mining, Mr. Morris had been prominent in industry affairs and organizations for many years. He was a director and member of the executive committee of the New River Association at the time of his death and was a past president of that organization. He also was active in the NCA and the West Virginia Coal Association. On graduation from Ohio State University in 1901, he joined the Modoc (Ohio) Coal & Mining Co., becoming superintendent a year later. From 1903 until 1917, Mr. Morris held various official positions with coal mining firms in the United States, Mexico and Canada. In 1917, he joined Gauley Mountain to take charge of mining operations and had held that post until his death.

Bernard P. Melton, 40, since 1940 assistant chief engineer for the Ayrshire Collieries Corp., died Feb. 22 at his home in Indianapolis. A graduate of Rose Polytechnic Institute, Mr. Melton was employed by the state highway department before joining Ayrshire.

Cecil A. Kirby, 55, chief engineer for the Creech Coal Co., Twila, Ky., died in February.

Martin L. Watson, president, Masteller Coal Co., Keyser, W. Va., died March 5 in West Palm Beach, Fla. Mr. Watson had been active in coal mining in Mineral County, West Virginia, practically all his life.

W. W. Merwin, superintendent of the Filbert, Palmer and Ralph mines of the U. S. Steel Co., died March 16 in the Uniontown (Pa.) Hospital

William A. Perry, 69, vice president, Greensburg-Connellsville Coal & Coke Co., died March 9 at his home in Clearfield, Pa., after a heart attack.

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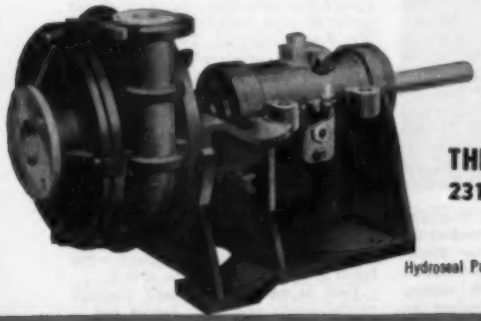
See the new Hydroseal at COAL SHOW
Cleveland—May 14-17
Booth 921

●●●you can put a new shell liner in a Hydroseal Pump—in fact, it's an easier job. That's because these liners are moulded to shape from flexible, super-tough Maximix Rubber—the material that outlasts metal 4 to 6 times under similar service conditions. Other Maximix parts fit just as quickly into place, and upon reassembly are mechanically locked in the correct position. No cementing or vulcanizing is required. Matching machined surfaces give a positive means for swift, accurate reassembly.

Another thing you'll like about these pumps is that the Maximix Rubber parts weigh 80% less than metal equivalents. This feature means much easier handling, and it will also save you a lot on shipping costs.

For complete details on this pump that's engineered for long runs and short stops, write for Catalog 850.



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Hydroseal Pumps are also made with alloy wearing parts for coarse material service.

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HYDROSEAL PACKLESS AND MAXIMIX DESIGNS ARE COVERED BY PATENTS AND APPLICATIONS IN THE MAJOR MINING CENTERS OF THE WORLD.

***INDUSTRY MEETING*—A Special Coal Age Staff-Written Report**

AIME MEDAL WINNERS—James D. Francis (left photo), chairman of the board, Island Creek Coal Co. and affiliated companies, is given the Charles F. Rand medal for "distinguished achievement in mining administration." James B. Morrow (right photo), first vice president, Pittsburgh Consolidation Coal Co., is awarded the Erskine Ramsay medal for "outstanding achievement in the production, beneficiation and utilization of coal." Both presentations were made by D. H. McLaughlin, AIME president and president, Homestake Mining Co.

Coal Division Scans Problems and Progress

AIME Group Debates Depreciation and Taxes at Annual Meeting—Extensible Conveyor Unveiled for Continuous Mining—Survey of Coal Reserves Gains Speed—Research and Technology Mark Up Big Gains

FIRST ANNOUNCEMENT of an extensible multi-unit belt conveyor for intermediate haulage between a continuous mining machine and mainline haulage and authorization to form a committee to study depreciation, depletion and accounting practices in the coal industry were highlights of the annual meeting of the Coal Division, AIME, in St. Louis, Feb. 19-21.

In addition, achievements of four coal-industry leaders were recognized in the award of the Charles F. Rand medal to J. D. Francis, chairman of the board, Island Creek Coal Co.; presentation of the Erskine Ramsay medal to J. B. Morrow, first vice president, Pittsburgh Consolidation Coal Co.; and admission to the Legion of Honor, Class of 1901, of James F. Brophy, consulting engineer, Red Lodge, Mont., and Lewis E. Young, consulting engineer, Pittsburgh, Pa.

Depreciation, depletion and taxation in coal-company management was the subject of a day-long discussion on Monday, with J. W. Woomer, J. W. Woomer & Associates, Wheeling, W. Va., and Clayton G. Ball, Paul Weir Co., Chicago, co-chairmen at the morning session, and A. L. Toenges, U. S. Bureau of Mines, presiding at the afternoon session. Major participants in the discussion were: R. M. Kelday, The Steel Co. of Canada, Ltd.; D. L. McElroy and G. W. Kratz, Pittsburgh Consolidation Coal Co.; Lee Barrett and E. A. Reilly, Joy Mfg. Co.; T. H. Bierce, Rochester & Pittsburgh Coal Co.; T. C. Cheasley and Roy Park, Sinclair Coal Co.; and Dr. W. J. Graham, University of Chicago.

Under the new Canadian tax laws, accelerated depreciation is allowable, Mr. Kelday reported. Taxable income is computed by means of a complex formula based on classification of assets. Mining machinery, for instance, is allowed 30% depreciation in the first year; air shafts and expendable tools, 100%. Profit or loss in the sale of used equipment is treated as an adjustment of depreciation but is not wholly recoverable within the year of sale. In fact, no item ever is fully depreciated but over a period of years the loss becomes infinitesimal. Though the present law is an improvement over earlier tax statutes, nothing has yet been done to ease the problem of rising equipment costs.

Accounting practice at Pittsburgh Consolidation Coal Co. is aimed at allocating the cost of existing facilities to the proper fiscal period and at providing funds for future capital needs, Mr. McElroy said. Tracing the development of this practice through the several mergers leading to the formation of his company, he said that the present plan is designed to recover the value of all fixed facilities on the basis of tonnage produced, with depreciation rates per ton based on the commercial-tonnage reserves. Advantages of this method are: (1) flexibility, guaranteeing recovery over the life of the mine; (2) greater dollar depreciation in periods of high production and greater profits; and (3) correlation of depreciation and depletion. Transferable-equipment items are classified in 16 groups, each group being assigned its own depreciation rate, he explained. Concluding, Mr. McElroy urged higher depletion allowances for coal and a consolidation of efforts along this line with other industries that have a stake in depletion allowances.

Though much of Pittsburgh Consolidation's depreciation charges is based on new high-cost plants and equipment, less than one-third of net earnings was disbursed as dividends, Mr. Kratz reported. The company is not seeking accelerated depreciation but would welcome fair treatment in the depletion percentages allowed the different fuel industries, he said.

More tax revenues will be sought by the federal government and the industry might as well accept that fact, Mr. Barrett warned. However, a critical problem for coal lies in the speed of obsolescence through new-type machines and new mining methods and the industry must seek some relief in this direction, he urged.

Coal is mortgaging itself through capital loans and stock issues and is being denied fair distribution of earn-

NEW MEMBERS—LEGION OF HONOR: Lewis E. Young, consulting engineer, Pittsburgh, Pa.; and James F. Brophy, consulting engineer, Red Lodge, Mont. Both have been members of AIME since 1901 and were honored for their 50 years of participation in industry affairs through the AIME organization.

ings because it costs more to replace equipment than present depreciation rates allow, Mr. Reilly said. Since coal must stay strong to support the Nation's defense, the government should carry its share of the load by adjusting depreciation rates. With rapid advances in machine design, present depreciation rates are inadequate to keep a company abreast of modern methods. In the long run, increased depreciation rates would benefit the government by speeding mechanization, which in turn would produce higher profits and therefore more tax revenues.

Capital erosion through inflation, coupled with depreciation based on original cost, has created a critical financial problem for coal as well as other industries, Mr. Bierce stated. The problem is especially critical respecting tangible plant and equipment, leading to understated costs, overstated income, and payment of taxes and dividends out of capital.

A sound tax policy would recognize that capital exhaustion is equally serious whether through capital erosion or deterioration of tangible assets, he argued. Citing the disappearance of some $643,000,000 in net fixed capital in the coal industry in the last 17 yr, he warned that the survival of the industry is questionable. Five remedies have been proposed, as follows: accelerated depreciation on original cost, the diminishing-balance method of computing depreciation, depreciation on replacement cost, revaluation of assets, and adjustment of selling prices. For the present stage of inflation, Mr. Bierce offered these suggestions: (1) adoption of the diminishing-balance method; (2) no reduction in the depreciation base unless the allowance can be applied against taxable income; and (3) adjustment of price policies so that retained earnings will be adequate to replace facilities necessary at higher price levels.

"Average useful life" has various meanings related to the kind of work machines must perform in different mines and in different areas of the Nation, Mr. Cheasley contended. This complex problem is further complicated by inflation.

Illustrating the need for pinpoint recommendations to taxing and legislative bodies and for flexibility in tax laws and administrative rulings, he raised the following questions: How can you calculate the present value of equipment in an inflationary period? If you replace a piece of equipment that is not fully depreciated with a piece of equipment of larger capacity, how do you figure depreciation? How can you allow for obsolescence? In certain strip mines where coal is quickly exhausted and moves are frequent, how can you estimate "average useful life"? What happens to "average useful life" when a mine shuts down? Mr. Cheasley urged an early attempt by the Coal Division, AIME, to come to a meeting of minds on policy and procedure and to outline a course of action.

A. B. Crichton, president, Johnstown Coal & Coke Co., speaking from the floor, expressed concurrence with Mr. Cheasley's proposal. C. J. Potter, president, Rochester & Pittsburgh Coal Co., warning that no plan that reduces the tax take would be acceptable to the government at this time, suggested that the industry make long-range plans rather than immediate proposals and that it enlist the support of other politically strong groups.

In accordance with these suggestions, a committee was authorized to study and make recommendations on depreciation, depletion and accounting practices, working closely with National Coal Association and National Bituminous Coal Advisory Council.

Each ton of coal should bear its share of depreciation and depletion, Dr. Graham said. Yet in conventional accounting practice in coal, time rather than tonnage is the depreciation factor. There should be a declining rate of depreciation to take care of repair and maintenance of equipment and economic usefulness should be a factor in computing depreciation, he said.

By abandonment of the time basis and adoption of the tonnage basis for

(*Continued on p. 145*)

COAL MEN ON THE JOB

HUDSON COAL CO., Scranton, Pa.: William B. Roth (left), ventilation inspector; Edison Thomas, superintendent; Anthony Walsh, section foreman; Arthur Softley; Thomas Griffiths, section foreman; Karl T. Miller, safety engineer; John M. Reid, general manager; and Joseph Nixon, mine foreman, about to board a train to attend the 1950 meeting of the National Safety Congress. Messrs. Thomas, Walsh, Griffiths and Nixon won their trip at company expense by their leading safety performance in various sections of the company.

BCR Assesses Opportunities

Substantial Progress Attained on Varied Market Fronts Must Be Promoted to Industry and Public if Competitive Inroads Are to Stop, BCR Officials Report in Annual Meeting—Study for Broadened Program Set

INDUSTRY MEETING
— A Special Coal Age Staff-Written Report

IF BITUMINOUS COAL is to meet its intense and growing competition and increase, or even hold, its markets, the industry must support on a broad scale an adequate program that comprises not only laboratory research but the essential interrelated activities of engineering development, engineering service, technical information and sales promotion, some 250 members and guests were told at the annual meeting of Bituminous Coal Research, Inc., Columbus, Ohio, March 7.

Coal's competitors are spending millions of dollars annually on such activities, speakers emphasized, and as a result have been able to capture various bituminous markets almost at will. Although BCR's general research program has been confined mainly to laboratory research, a necessary first step, because of lack of funds and authorization, it has developed a wealth of invaluable technical information that could be used to sell coal. But since there is no adequate balanced program for the practical development and promotion of technical improvements, the industry has lost, and is losing, huge tonnages of coal by default, it was pointed out.

The preliminary step toward such a program was taken in the closed business meeting when members formally requested BCR President Dr. A. A. Potter to appoint a committee of top-level coal executives that will: (1) evaluate the research, engineering and promotional needs of the industry as soon as possible: (2) recommend an effective program to step up industry progress; and (3) obtain industry consideration of the plan at an early date. The committee to be appointed will include representatives of BCR and NCA, plus executives of coal companies not currently members of BCR.

Carrying out its theme of "Research to Meet Competition," the general open meeting featured reports of the progress and potentialities of BCR's work in its three main fields of activity; mining-machinery development, general research, and development of a coal-burning gas-turbine locomotive. Exhibits in an adjoining hall showed visitors details of the various projects, the many publications available, and models of the newly developed continuous-mining head and extensible steel conveyor belt (see p 81).

BCR has completed the assigned laboratory research on three-fourths of all projects authorized to date, Harold J. Rose, vice president and director of research, reported to members during the business session. Useful information or inventive ideas have resulted in each case and "these laboratory results are far more extensive and more promising than you may realize." Yet BCR members have not obtained more than a fraction of the potential benefits, he pointed out, because "research cannot pay off properly until adequate funds and a plan of action are provided to get research discoveries into practical use." The problem is simply that the coal industry "has not yet provided the means for bridging the big gap that always lies between a laboratory development and its widespread commercial use," Dr. Rose emphasized.

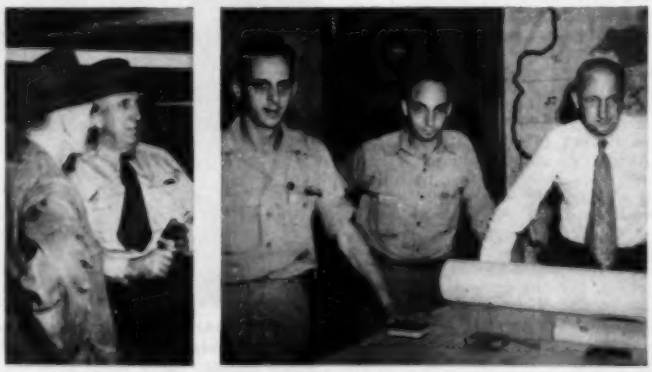
When BCR's activities were enlarged in 1944-45, those responsible for the program realized that its budget was inadequate to finance both the laboratory-research and commercial-development phases of all the projects that urgently needed attention. They therefore favored concentration on laboratory work, planning to refer the findings to equipment manufacturers and large coal users for the necessary engineering development and commercial introduction, Dr. Rose explained. Yet the laboratory solution usually is only the first and cheapest step in establishing a new product or process commercially and "it is common industrial experience that the cost of engineering development and commercial introduction may be from 4 to 10 times as great as the laboratory research on which a development is based."

As a result, and because equipment manufacturers have not been able to count on much help from the bituminous industry in market development and promotion, they have been reluctant to spend their own money to develop coal-burning equipment to compete with that using gas or oil. These industries maintain aggressive engineering and sales promotion to create a strong demand for their products and equipment manufacturers naturally prefer to fill an existing demand. It has therefore become amply clear that the coal industry cannot rely on manufacturers to do the whole job of applying research results and that it must at least meet them half way, Dr. Rose said.

In speaking of BCR's accomplishments, Dr. Rose continued: "Our files now contain some hundreds of excellent research reports and publications —packed with information—of which the coal industry is making far too

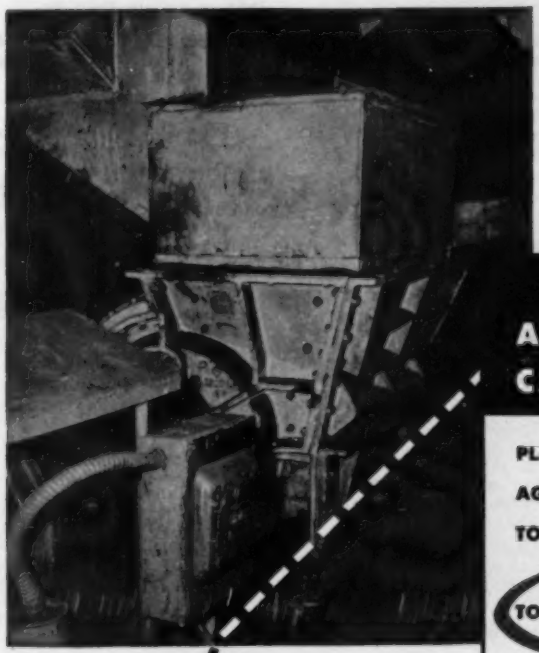
(Continued on p 166)

COAL MEN ON THE JOB



MANAGEMENT AND ENGINEERING at Inland Steel Co., Wheelwright, Ky.: J. T. Parker (left), superintendent of mines; E. R. Price, manager of coal properties; J. C. Kurlyka, chief draftsman; J. Peraino, assistant chief engineer; and H. O. Zimmerman, chief engineer.

These "CRUSHING" FACTS



Another
American Crusher
CASE HISTORY

PLACE: Illinois Coal Mine

AGE OF CRUSHER: 14 years

TOTAL TONNAGE CRUSHED: 1,472,805

TOTAL COST PER TON: one half of 1¢*

again prove
AMERICAN CRUSHER performance

*The total cost figure for the 14-year coal crushing operations of the Illinois coal mine, whose American Crusher record is shown above, includes: original cost of crusher (completely depreciated); plus cost of replacement parts; plus maintenance costs; plus interest on original investment (at 3% for 14 years).

But here is the really significant fact: an independent survey of users of American equipment has shown that this performance record is a typical one for Americans—a consistent pattern of high tonnage reduction at remarkably low parts-replacement cost.

Only such features as the exclusive Crushing Ring Design—originated and perfected by American—could reduce coal in power plants and coal mines across the country year after year, ton after ton, for *less than 1c per ton.*

Find out how you may reduce the cost of your own crushing problems.
Write for detailed information and illustrated literature.

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News In Brief

St. Lawrence Hearings Continue

With the conclusion of testimony favoring the St. Lawrence Seaway and Power project, opponents of the plan were to be given their day before the House Public Works Committee beginning April 2. Many industry and labor groups and other interests have joined with the coal industry in opposing the project, which is being strongly supported by Pres. Truman as necessary to the national defense.

New Film Sells Retail Coal

A new sound-and-color film entitled "Your Business Begins in the Customer's Basement" was scheduled to be given the full Hollywood "first night" treatment by its producers, the Coal Heating Service group of Des Moines, Iowa. To be previewed at a dinner April 10 attended by prominent representatives of the coal and heating equipment industries, the film shows how customers can be served "heating satisfaction" through the cooperative efforts of coal retailers and heating contractors. The case-history-type film staged by the retailer group will be available for use of other organizations in the country through the CHS Div. of the NCA, which cooperated in its preparation.

Anthracite Safety Cited

Nine anthracite companies have accumulated a total of more than 29 million man-hr of exposure without a fatal accident, Joseph J. Walsh, Pennsylvania Deputy Secretary of Mines, reported March 12 in a circular letter complementing management and employees. The companies, each of which have operated for 1,500,000 or more man-hr without a fatality, are: Pompey Coal Co., Pennsylvania Coal Co., Buck Run Colliery Co., Repplier Coal Co., St. Clair Coal Co., Raven Run Coal Co., De Angelis Coal Co., Hammond Coal Co. and Duryea Anthracite Coal Co. In an earlier letter, Mr. Walsh reported that the industry's fatality rate for the first 2 mo of 1951 was 0.78, which is 5% better than the same 1950 period.

Pittsburgh Consol Reports

Pittsburgh Consolidation Coal Co. last month reported 1950 net earnings of $16,145,133, or $7.49 a share, compared with the 1949 net of $14,533,072, or $6.72 a share, exclusive of $872,485 loss on property disposal. Output during 1950 was 24,029,905 tons, an increase of 17.5% over 1949. In reviewing the company's record since merger with the Consolidation Coal Co. George H. Love, president, reported that earnings had totaled $71,542,000 from 1946 through 1950, or an average annual return of $6.64 a share. Output per man-day has increased from 7.5 tons in 1946 to 10.3 in 1950, a rise of 37%. Capital expenditures have provided an 80% increase in daily capacity of mechanically cleaned coal, which will soon be expanded to a total of 136,200 tons daily, he said.

Other company reports recently released include:

Old Ben Coal Corp.—1950 net income of $2,523,512, or $2.88 a common share on sales $37,207,077, compared with a 1949 net of $1,424,281, or $1.62 a share, on net sales of $29,508,913.

West Kentucky Coal Co.—1950 estimated net income, $3,270,919, or $3.82 a common share, compared with $3,523,793, or $4.11 a share in 1949.

Elk Horn Coal Corp. — 1950 Net profit (from receivers' report), $109,990, equal to $1.86 a second preferred share on gross income of $7,448,081, compared with the 1949 profit of $112,861, or $2 a share on a gross of $6,364,550.

Independent Coal & Coke Co.—1950 net profit of $98,019, compared with $238,581 in 1949.

And for Your Information . . .

The UMWA Welfare and Retirement Fund March 12 broadened its program to make all miners totally disabled for 6 mo. eligible for rehabilitation cash benefits regardless of age if they meet other requirements. Eligibility previously has been based on age, ranging from 45 to 60, and on length of disability, varying from 1 to 5 yr.

The anthracite industry would pay a 3% state tax on every ton of coal mined if a bill introduced into the Pennsylvania House of Representatives is passed. Proceeds would be used as a special "anthracite reparation fund" to pay claims on private property damaged by surface subsidence resulting from underground operations. Another bill before the Pennsylvania legislature would levy a tax on fuel oil of 1¢ a gal., with the revenue devoted exclusively to paying the cost of the state's World War II bonus. A third bill calls for a tax of 7¢ per thousand cubic ft on natural gas consumed in the state, also to be used in paying for the state bonus.

The fatality rate at its Widen, W. Va., mine is almost five times better than the average for mines in West Virginia, the Elk River Coal & Lumber Co. recently reported. Up to Dec. 31, 1950, the mine had produced 3,267,820 tons since the last fatality.

This spring's planting program of the Kentucky Reclamation Association will include the planting of 10,000 lb of legume seeds and more than a million tree seedings on strip-mined lands in western Kentucky.

In Virginia, a jury award of $3,000 to two homeowners for damage to their property from dust from a nearby tipple was upheld last month when the state Supreme Court refused to review the case. A jury in the Tazewell County Circuit Court had ordered the payment by the Doran Coal Co. after it found that dust from the company's tipple had "inconvenienced" the homeowners and had depreciated the market value of their property, which was bewteen 50 and 75 ft of the tipple.

More than 100 mine foremen will receive safety awards from the Safety Div. of the NCA at special ceremonies to be held in Washington May 11-12. Some 160 foremen are eligible for the awards, which recognize 4 or more yr of supervision without accidents among crew members. There are now more than 1,200 formen who have supervised crews for a year or more without accidents, the NCA estimates.

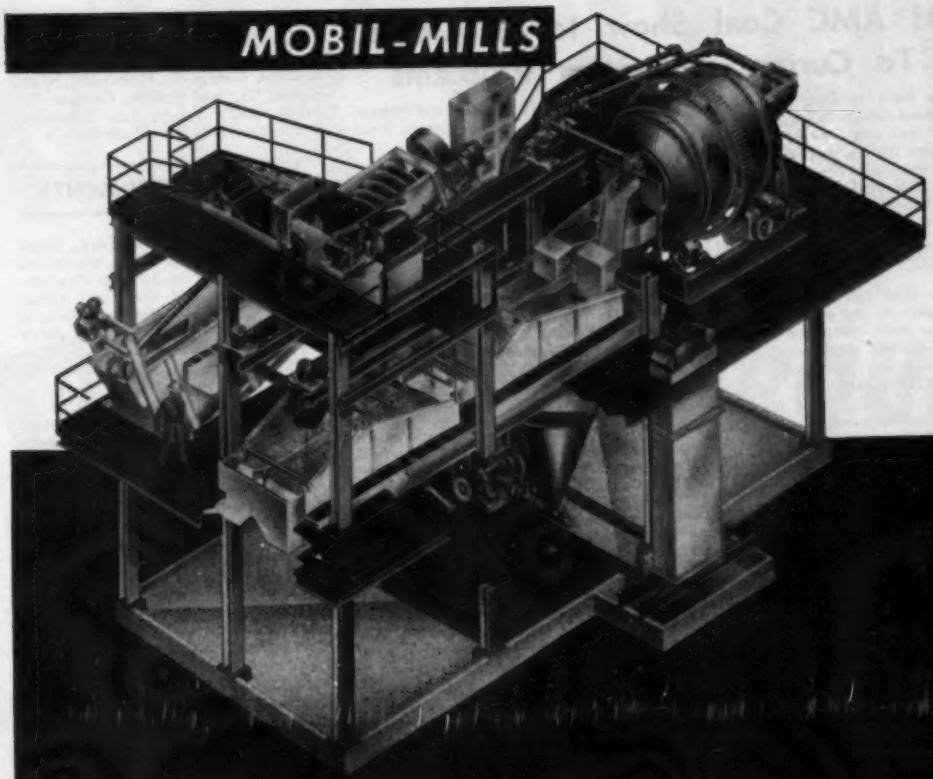
The Texas House of Representatives is reported to have adopted a resolution calling on the Texas Railroad Commission, to oppose any future applications to the FPC for pipelines using natural gas. The commission, which is the state agency regulating oil and gas, also is considering a petition that it regulate the price of natural gas at the well.

Sixteen members of a United Kingdom coal-management and labor group sailed for home March 19 after a 6-weeks' study of American coal mining that included visits to mines in Arkansas, Illinois, West Virginia and Pennsylvania. Sponsored by the ECA, the group will report to the British coal industry on American mechanical-mining methods and machinery that might be used to beat Britain's production crisis.

In Missouri, House Leaders said March 7 that they would try to get early action on a bill regulating strip-mining introduced in the legislature the week before. Under the bill, operators would have to post a bond of $1,000 an acre to guarantee within a reasonable time the replacing of the soil excavated and filling of ditches and trenches.

The already large consumer and trade interest in the Anthracite Institute's traveling equipment display is expected to increase sharply this spring when a new and enlarged display is completed for home and building shows, the Institute reports. Some 80 ft across the front in its full size, the display will continue to feature four types of modern automatic heating equipment and also point up the advantages of anthracite as a fuel.

MOBIL-MILLS



7

WEMCO

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1951 AMC Coal Show to Be Geared To Current Operating Problems

With both exhibits and technical discussions slanted toward helping operating men meet the varied problems stemming from a rapidly growing defense economy, the 1951 American Mining Congress Coal Convention and Exposition is expected to top all previous records, preliminary reports indicate. The dates are May 14-17 in the Public Auditorium, Cleveland, Ohio.

More than 225 manufacturers will participate in the exposition, to provide the most comprehensive display of coal-mining machinery, equipment and materials ever gathered under one roof. The 1949 show, breaking all previous records, was attended by some 14,000 mining men from all parts of the country.

Leading off with discussions of coal and national defense and industry public relations, the convention program being arranged will cover the latest practices in every phase of modern mine operation. C. J. Potter, president, Rochester & Pittsburgh Coal Co., is national chairman of the program committee. L. C. Campbell, vice president, Coal Division, EG&FA, is chairman of the Coal Division, and J. T. Ryan, Jr., executive vice president, Mine Safety Appliances Co., is chairman of the Manufacturers' Div.

Subjects and speakers on the convention program include:

NATIONAL DEFENSE AND PUBLIC RELATIONS—Coal and National Defense, speaker to be announced; Public Relations in the Anthracite Industry, F. W. Earnest Jr., Anthracite Institute; Public Relations in the Bituminous Fields: Company Magazines and TV Broadcasts, George Van Hagan, Peabody Coal Co.; and Mining Community Activities, J. E. Elkin, Duquesne Light Co.

COAL PREPARATION—A Panel Discussion on Problems and Solutions, including: Wet Cleaning Fine Coal, Byron Bird, Jeffrey Mfg. Co.; Current Practices in Air Cleaning, W. C. McCulloch, Roberts & Schaefer Co.; Recent Developments in Coarse-Coal Cleaning, David R. Mitchell, Penn State College; Cleaning Small Sizes of Anthracite, James Hannigan, Glen Alden Coal Co.; and Related Problems of Mechanical Coal Cleaning, F. P. Calhoun, Rochester & Pittsburgh Coal Co.

MAINTENANCE AND POWER—Planning for Preventive Maintenance, W. E. Wolfe, National Electric Coil Co.; Underground Maintenance Organization, Wm. MacGregor, Bell & Zoller Coal Mining Co.; Lubrication of Mining Equipment, V. O. Murray, The Union Pacific Coal Co.; Automatic Centralized Lubrication, L. W. Deutsch, Trabon Engineering Corp., and J. B. Anderson, The Texas Co.; and AC and DC Operation-Comparative Costs, J. Z. Linsenmeyer, Westinghouse Electric Corp.

ROOF SUPPORT—Roof Bolting With Large Mobile Equipment, John K. Berry, Consolidation Coal Co. (Ky.); Roof Bolting in Thin Seams With Portable Equipment, C. E. Hough, Imperial Smokeless Coal Co.; Geological Considerations in Roof Bolting, Paul H. Price and A. T. Cross, W. Va. Geological Survey; Roof Bolting With Dust-Control Equipment, James Westfield, USBM; and Combined Coal Drill and Timber-Setting Machine, Clarence M. Hays, Pittsburgh Coal Co.

STRIP MINING—Compressed-Air Vertical Drilling, W. J. Crawford, Enos Coal Mining Co.; Selective-Elevation Horizontal Drilling, Donald B. Saxton, Hanna Coal Co.; Other Late Developments in Overburden Drilling, Gene H. Utterback, United Electric Coal Cos.; Drilling and Blasting in Two-Seam Stripping, Russell Badgett Jr., Badgett Mine Stripping Corp.; and Large Augers for Highwall Mining, Charles Compton, Grafton Coal Co., and D. M. Bondurant, W. Va. University; Torque Converters in Strip-Mine Haulage Units, R. M. Schaeffer, General Motors Corp.; and Stripped-Land-Use Developments, speakers to be announced.

MECHANICAL MINING—Mechanical Loading With Extensible Conveyors, A. B. Crichton Jr., Johnstown Coal & Coke Co.; Trackless Mining in 30-In Coal, Irvin C. Spotte, Princess Elkhorn Coal Co.; Main-Entry Development in Low Coal, W. D. Hawley, EG&FA; Mechanical Mining in Anthracite, B. F. Young, Philadelphia & Reading Coal & Iron Co., and W. I. Stonebraker, Hudson Coal Co.

SAFETY—Protection Against Electrical Hazards in Coal Mining, George C. Barnes, VPI; Pulmonary Diseases as Related to Coal Mining, Dr. A. J. Vorwald, Trudeau Foundation; Advances in Illumination for Coal Mines, G. F. Prideaux, General Electric Co.; and Permissibility of Diesel Locomotives for Coal Mining, J. H. East, Jr., USBM.

CONTINUOUS MINING—A Symposium Covering Machines and Operating Methods, Gerald Von Stroh, BCR; A. Lee Barrett, Joy Mfg. Co.; M. F. Cunningham, Goodman Mfg. Co.; E. M. Arentzen, Lee-Norse Co.; and W. J. Phillips, Sunnyhill Coal Co.; Coordinating the Auxiliary Operations, H. B. Wickey, Pennsylvania Coal & Coke Corp.; and Slope Driving With a Continuous Machine, H. A. Treadwell, Chicago, Wilmington & Franklin Coal Co.

COAL UTILIZATION—Problems of Industrial Mobilization, speaker to be announced; Research for Future Uses of Coal, Dr. A. A. Potter, BCR; New Developments in Coal-Burning Locomotives, George D. Creelman, M. A. Hanna Co.; and Cyclone Furnace Develops High Combustion Efficiency, Merle Newkirk, Dow Chemical Co.

NEW DEVELOPMENTS

The Jewell Ridge Coal Corp., Tazewell, Va., early last month announced the purchase of the Jones & Heatherman Coal Co. and the Peach Creek Chilton Coal Co., with operations in Logan County, West Virginia. Jones & Heatherman has been operating in the Logan field for more than 20 yr. The Peach Creek Chilton Coal Co. was organized in 1949. Jewell Ridge also operates in the low-volatile field of Virginia and in the Leatherwood district of Kentucky.

Peabody Coal Co., Chicago, has acquired from the Zeigler Coal & Coke Co. approximately 12,000 acres of coal and other mineral rights in Christian County, Illinois, and 12,000 additional acres of coal and other mineral rights in Bond County, Illinois, Stuyvesant Peabody Jr., president, announced March 7. The property acquired from Zeigler Coal & Coke adjoins other properties owned by Peabody Coal and will facilitate its mining operations in the future, Mr. Peabody said. Later, on March 21, it was announced that Peabody plans to issue 160,000 shares of a new series $25 par 5½% preferred stock and float a $6,000,000 debenture issue, the proceeds of which will be used for the construction and development of new mine properties and for restoring capital already used for that purpose. Commonwealth Edison Co. has made a new agreement with the company, it also was reported, contracting to purchase from Peabody at least 50% and not more than 66⅔% of its annual coal needs. Effective until Dec. 31, 1982, the new contract supersedes one in effect that would have run until 1958.

Construction work on the new $5,000,000 Allen mine of the Colorado Fuel & Iron Corp. is progressing rapidly, according to reports early last month. The west portal has been completed and a slope has been driven in about 250 ft from that portal. A 60x200-ft building housing offices, shops and change facilities is nearly finished and the hoist house nearby is under construction, it was said. Work on the belt and man-way slopes to be driven 2 mi east of the portal was expected to be started shortly.

Development work on a new mine in the No. 6 seam has been begun by the Dawson Daylight Coal Co., Dawson Springs, Ky., according to an announcement by J. H. Schneider, president. The new operation will be located between the present Dawson

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Daylight mine and that of Dawson Collieries, Inc., and it will be known as the New Daylight mine.

Bethlehem Collieries Corp. is opening a new mine in its Ellsworth (Pa.) Div., to be known as Mine No. 60. Plans call for construction of a new washing plant to serve the operation.

The Kaiser Steel Corp. March 13 formally entered the commercial coal business, with the announcement by J. L. Aahby, vice president and general manager, that the Utah Fuel Co., a wholly-owned subsidiary, had been merged with the parent corporaiton. Richard E. Hoagland, vice president and assistant general manager of the Utah Fuel Co., has been made vice president of Kaiser Steel and will continue to direct the activities of the fuel division, with headquarters in the Judge Bldg., Salt Lake City.

Utah Fuel originally was purchased a year ago by Kaiser Steel to secure the vast deposits at Sunnyside, Utah, which supply coking coal to the Kaiser steel mill at Fontana, Calif. In addition, commercial or non-captive coal mines at Castle Gate and Clear Creek, Utah, and at Somerset, Delcarbon and Oliver, Colo., were taken over by Kaiser Steel. In commenting on the merger, Mr. Hoagland stated: "Merger with the parent company is designed to streamline the corporate setup and permit a stepping up of the marketing tempo of commercial coal. The Kaiser name is well known for quality and service, and we feel this move will increase the public acceptance of our coal throughout the entire western area. The coal will continue to be sold, however, by the brand names of Castle Gate, Blue Blaze, Red Glow, Somerset and Oliver, long ranked in the forefront of quality coals."

Among the Manufacturers

The Ohio Brass Co., Mansfield, Ohio, has named Kenneth Benson district manager of the mining fields in the Pittsburgh area. He will serve the territory formerly covered by the late Richard Goss, with headquarters in Pittsburgh. Before joining O-B, Mr. Benson was associated with the Standard Oil Co. and the Bethlehem Steel Co.

W. A. Roberts has been elected president of Allis-Chalmers Mfg. Co., succeeding the late Walter Geist. W. C. Johnson, executive vice president in charge of the general machinery division, was named executive vice president for the entire company. R. S. Stevenson, general sales manager of the tractor division, was named vice president in charge of the tractor division. Other new appointments include: J. L. Singleton, vice president in charge of the general machinery division; A. W. Van Hercke, vice president in charge of engineering for the tractor division; John Ernst, vice president in charge of tractor-division manufacturing; and Fred Mackey, vice president in charge of general-machinery manufacturing. Mr. Roberts joined Allis-Chalmers in 1924 as a salesman. He became vice president in charge of the tractor division in 1944, and was elevated to executive vice president in charge of that division in 1947. Mr. Johnson, who started with Allis-Chalmers in 1924 as a machinist's helper became vice president of the general-machinery division in 1944 and executive vice president in 1947. Mr. Stevenson has been associated with the company since 1933 and was named general sales manager of the tractor division last year. Willis G. Scholl, eastern territory manager since 1947, has been named general sales manager for the tractor division, succeeding Mr. Stevenson.

Albert J. Gurney, 77, chief mechanical and electrical engineer for the American Mine Door Co., Canton, Ohio, died Feb. 16 at his home in Canton. Mr. Gurney was the inventor of the automatic switch thrower and, during his 35 yr of service with the company, developed the rock-dusting machines and other products manufactured by the company. Prior to joining American Mine Door, Mr. Gurney was chief electrician for the mines of the Madison Coal Corp. in southern Illinois.

Link-Belt Co., Chicago, has named Maurice J. Erisman, formerly chief engineer at the Los Angeles plant, assistant chief engineer for its Pershing Road Chicago plant. Homer J. Foye, chief engineer at the Seattle plant, has been appointed chief engineer at Los Angeles, to succeed Mr. Erisman. Thomas Cornils, formerly in engineering sales in Seattle, has been named to succeed Mr. Foye.

Westinghouse Electric Corp., Pittsburgh, has announced the election of four new vice presidents, as follows: Tomlinson Fort, manager of the company's headquarters apparatus sales department at Pittsburgh; L. W. McLeod, southwestern district manager; Emery W. Loomis, Middle Atlantic district manager; and L. E. Lynde, who has been New England district manager, but now will head the company's Washington, D. C., government office. L. D. Rigdon, formerly manager of Westinghouse's Headquarters Manufacturing Div., has been named assistant to the vice president in charge of manufacturing, and C. G. Wallis has been named manager of the division, to succeed Mr. Rigdon. Mr. Wallis formerly was director of the Headquarters Manufacturing Engineering Dept.

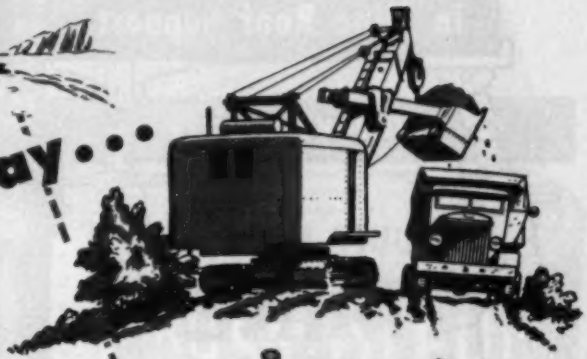
Transfer of three Independent Pneumatic Tool Co. branch managers and the appointment of one new branch manager have been announced. John B. Dempsey, for the past 3 yr manager of Thor's Pittsburgh branch, has been named manager of the Detroit branch, succeeding Robert G. Faverty, recently appointed managing director of Armstrong-Whitworth & Co. Pneumatic Tools, Ltd., new Thor subsidiary in England. Edward W. Krants, for the past 4 yr manager of the New York branch, has been appointed Pittsburgh manager to succeed Mr. Dempsey. William J. McGraw, manager of

COAL MEN ON THE JOB

PREPARATION STAFF at Inland Steel Co., Wheelwright, Ky.: B. Grimm (left), laboratory technician; E. M. Pace, superintendent of the new Price plant; R. A. Jimenez, preparation engineer; and Greely Waddle, preparation-plant foreman.

First up . . .

First away . . .



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EQUIPMENT APPROVALS

Two approvals of permissible equipment were issued by the U.S. Bureau of Mines in February, as follows:

Jeffrey Mfg. Co.—Power unit for underground conveyor; one 25-hp motor, 550 v, DC; Approval 528-A; Feb. 20.

Goodman Mfg. Co.—Type 90-HC-30 belt conveyor; one 30-hp motor, 250 v, DC; Approval 2-778; Feb. 1.

the Cleveland branch for the past 2 yr, has been named manager of the New York branch to succeed Mr. McGraw. With the purchase of the English company, the Armstrong-Whitworth pneumatic tool company and its big Close works section in Gateshead employing 750 employees now becomes an affiliate of the Independent Pneumatic Tool Co., Ltd., London, England, a subsidiary of the parent company.

Ralph J. Cordiner, president of the General Electric Co., has announced the election of three executive vice presidents. Named to fill newly-created posts with responsibilities as assigned by the GE president were: Henry V. Erben, formerly general manager of the GE Apparatus Dept.; Hardage L. Andrews, general manager of the Appliance and Merchandise Dept.; and Roy W. Johnson, general manager of the Affiliated Manufacturing Companies Dept. Francis K. McCune, formerly assistant general manager of the company's Nucleonics Dept., has been appointed manager of engineering of the Large Apparatus Div., Schenectady. Mr. McCune succeeds Ernest E. Johnson, who recently was named general manager of the company's General Engineering Laboratory.

The Okonite Co., Passaic, N. J., has appointed E. D. Youmans vice president in charge of manufacturing and research. Mr. Youmans, with the company since 1913 and previously vice president and technical director, will replace D. R. Stevens, executive vice president, who has retired from active service after 30 yr of managing the company's factory operations.

Herbert B. Nechemias has been appointed manager of the industrial sales department, Wagner Electric Corp., St. Louis, succeeding J. S. Smith, appointed director of purchasing. Mr. Nechemias has been a member of the sales department for the last 12 yr.

John T. Monahan has been appointed assistant sales manager, Safety Products Div., American Optical Co., Southbridge, Mass. Mr. Monahan joined the company as a development engineer in 1943 and became manager of respirator and specialty sales in 1948.

A. William Fraser, general Euro-

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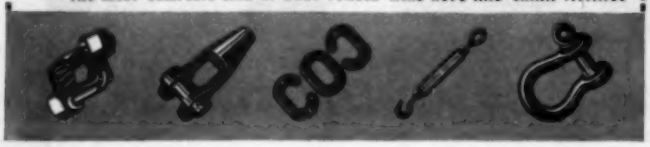


pean manager since 1945, has been appointed Midwest sales manager for the Worthington Pump & Machinery Corp., Harrison, N. J. Mr. Fraser will direct the sales of Chicago, St. Paul, Kansas City and St. Louis offices, making his headquarters in Chicago. J. J. Llanso, since 1947 a vice president and manager of Worthington, Ltd., Buenos Aires, Argentina, has been appointed general export manager for the company.

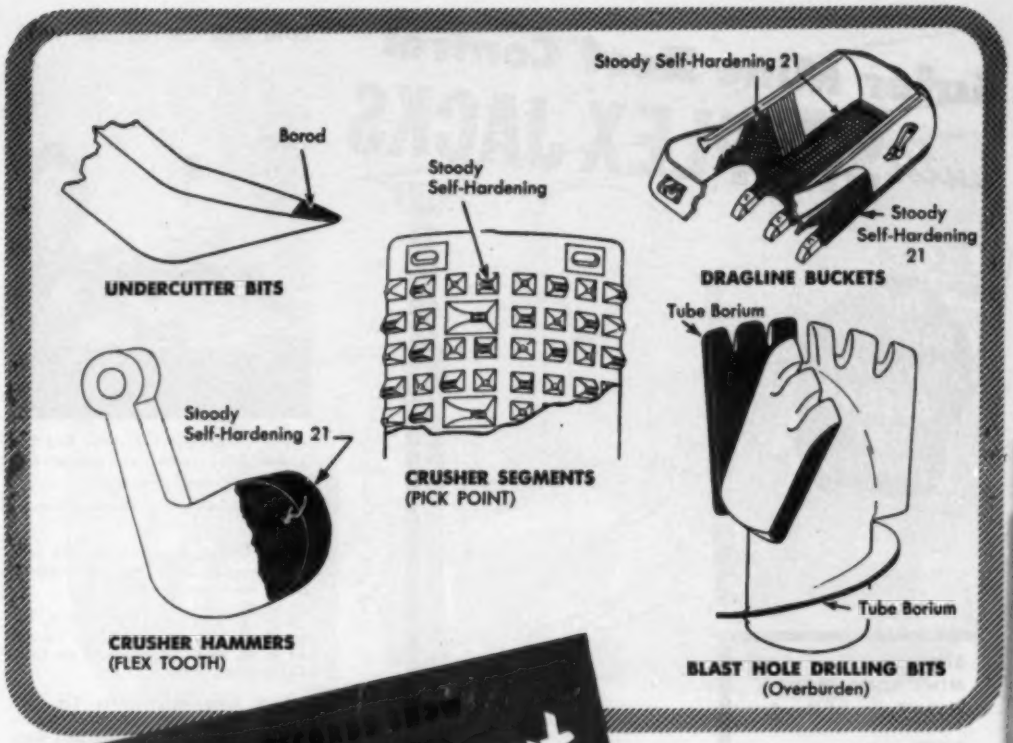
W. A. Edwards has been appointed district manager of the Trumbull Electric Mfg. Co.'s East Central District, with headquarters at the Norwood, Ohio, works. For the last 3 yr, Mr. Edwards has been switch, breaker and control sales manager in the company's main office in Plainville, Conn.

M. B. Garber, director of sales, The Thew Shovel Co., Lorain, Ohio, has been sworn in for services as an on-call consultant for the NPA. Mr. Garber will continue his duties at Thew but will be available to the NPA on matters pertaining to the requirement, use and production of construction machinery. While on loan to the government by Thew during World War II, Mr. Garber served as director of the construction machinery division of the WPB.

Johns-Manville Corp., New York, has announced the realignment of executive personnel to meet new conditions of manufacturing and distributing in a defense economy. Clifford F. Rassweiler has been appointed vice chairman of the board, a newly created office, and has been delegated full responsibility for organization and direction of the new company planning board. He will also continue as vice president for research and development. Newly elected president is L. M Cassidy, who has been vice president for sales since 1946 and associated with the organization since 1926. He succeeds R. W. Lea, who has retired as president and director. Newly elected vice presidents of the company include: J. A. O'Brien, general manager of the Industrial Products Div.; Harold R. Berlin, general manager of the J-M Building Products Div.; and A. S. Elsenbast, general manager of the J-M Celite Div. All three formerly were vice presidents of Johns-Manville Sales Corp., a J-M subsidiary.

Richard Crawford has been appointed general sales manager for the British subsidiary of Mine Safety Appliances Co., Pittsburgh, in charge of sales throughout the British Isles and Europe. Before joining MSA's subsidiary, Mine Safety Appliances Co., Ltd., Glasgow, Scotland, Mr. Crawford was chief electrical engineer for the National Coal Board in Britain, a post he had held since 1947. Before that he was Deputy Chief Electrical Inspector of Mines.

Ernest S. Theiss has been named chief engineer, Davey Compressor Co., Kent, Ohio. Mr. Theiss, who has been



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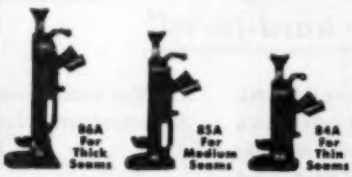

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COAL MEN ON THE JOB

LECKIE COLLIERIES CO., Aflex, Ky.: R. L. Simpson (left), cashier, and Rudolph Matney, superintendent.

assistant chief engineer for the past 6 yr, succeeds W. W. Warner, recently named vice president.

R. G. LeTourneau, Inc., Peoria, Ill., has appointed James W. O'Connor and J. W. (Bill) Gulledge to its field-engineering staff.

Ward Leonard Electric Co., Mt. Vernon, N. Y., has appointed Maury E. Bettis Co., 3319 Gillham Rd., Kansas City 3, Mo., as its industrial and electronic sales representative for the Kansas City area.

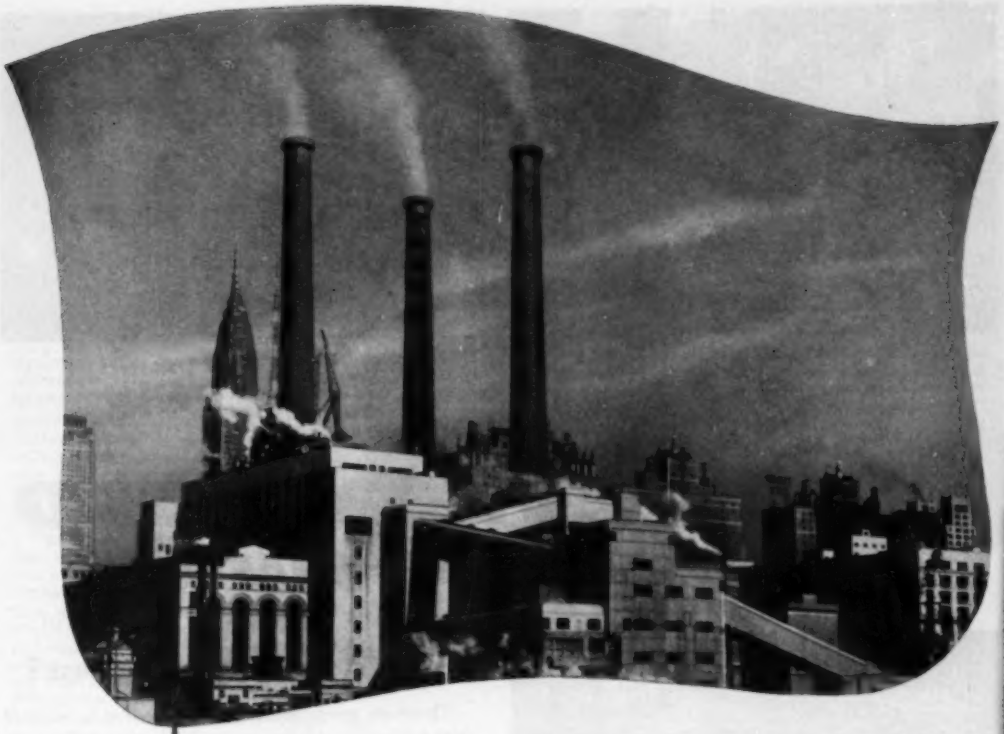
John E. Carroll, since 1949 general sales manager, American Hoist & Derrick Co., St. Paul, Minn., has been elected vice president of sales. Mr. Carroll joined American Hoist in 1937 as a district representative. From 1945 until his return in 1949, he was a partner in the firm of Harron, Richard & McCone Co.

Appointment of John C. Priest as sales representative in the Chicago district office has been announced by Marion Power Shovel Co., Marion, Ohio.

Swan-Finch Oil Corp., New York, has appointed Anthony J. Zino Jr. assistant to the president. Mr. Zino formerly was sales promotion manager and chief lubrication sales engineer.

C. J. Gerker has been named general manager, Ohio Hoist & Mfg. Co., Cleveland. Mr. Gerker was formerly vice president and general manager of the Midway Tool Co., Inc., Melvin, Ohio, and previously was associated for over 20 yr with the George Worthington Co., Cleveland.

Hercules Powder Co., has announced the completion of a three-story addition to the main laboratory building at its Experiment Station near Wilmington, the major project in a series



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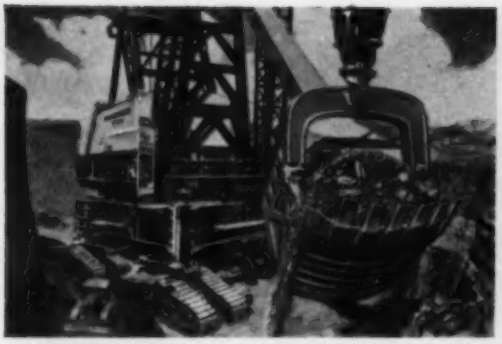

BIGGEST STRIPPER—at the Hanna Coal Co.'s Georgetown, Ohio mine – strips enough overburden in one bite to fill an average living-room, can swing its load two-thirds of a city block! This Marion-built giant is lubricated 100% by Socony-Vacuum!

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Famous Gargoyle oils and greases are top quality – backed by *85 years* of lubrication experience. Performance records in mines of every size and type prove they help increase efficiency, boost tonnage, materially cut downtime and maintenance costs.

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of expansions made during the past 5 yr. The addition provides 26 new laboratory units accommodating 51 chemists and increases the research facilities of the main building by more than 60%. The new wing is a part of a program to centralize and improve the facilities of the various divisions of the Experiment Station, the company reports.

A step designed to aid in the growth of western heavy-industry defense efforts has been announced jointly by the Mack Mfg. Corp., New York, and the Wooldridge Mfg. Co., of Sunnyvale, Calif. Under a recent agreement, the Wooldridge company will partially produce and fully assemble Mack off-highway vehicles in their main Sunnyvale plant and also will act as an exclusive distributor for such Mack equipment in 10 western states. An almost immediate effect of the arrangement will be to add $1 million to the payroll of the Sunnyvale plant. Plans are being rushed for the construction of a $250,000 modern assembly plant.

The Frank G. Hough Co., Libertyville, Ill., recently reported completion of a building program that has doubled its production capacity in less than a year. New facilities include a 96x306-ft high-bay assembly building, and enlarged painting, parts and material storage facilities, and a modern new one-story 18,000-sq ft office building accommodating the administrative, sales, advertising, accounting and engineering departments.

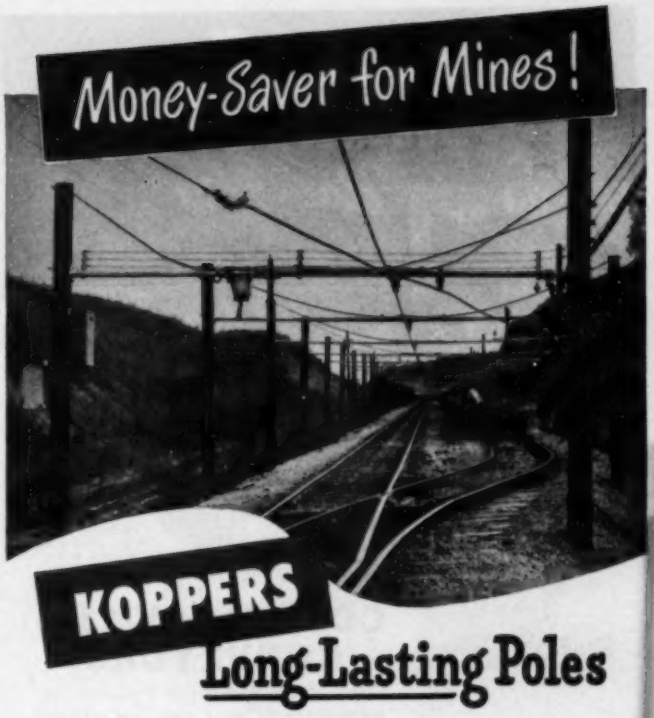
Joseph T. Ryerson & Son, Inc., has announced an expansion program at its St. Louis plant, which includes reconstruction and new layout of the present plant, and construction of additional warehouse space totalling approximately 50,000 sq ft. A company spokesman said that the new facilities were required to take care of the rising demand for steel for defense work. When the project is completed before the end of this year, warehouse and office space will total about 161,000 sq ft.

AIME Coal Division Scans Problems and Progress

Begins on p 128

depreciation, no depreciation or depletion would be charged when the mine is idle, Dr. Graham explained. Estimated costs would be projected throughout the life of the property and adjusted periodically, with depreciation and depletion charges allocated to each recoverable ton of coal. These allocations, as well as selling prices, would be adjusted regularly.

Present reporting methods, in terms of original dollar costs do not state the true condition of a business to the public or to taxing authorities, Dr. Graham contended. To correct



The trolley poles pictured here don't *look* like ordinary poles—and they're not! These Koppers Poles are made from strong Southern Yellow Pine. They will *stay* sound and serviceable because they're protected against decay by Koppers Pressure-Creosoting Treatment.

This treatment greatly reduces the number of costly replacements . . . cuts down repairs . . . effects substantial savings. Koppers Pressure-Creosoted Poles provide rigid support for trolley and feed lines—support you can count on, year after year.

Koppers Pressure-Treated Wood, used in place of ordinary wood, can save money for mine operators in other ways, too. Treated ties, for example, not only stand up under heavy pounding, but frequently cut costs more than 60%. Treated timber sets and props often cut costs over 75%.

That's not all! These and other savings are detailed in our free book, "10 Proven Ways to Cut Mining Costs." Send for a copy, and find out what Koppers Pressure-Treated Wood can do for you. Use the coupon.

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this misrepresentation, he proposed use of a scientific dollar-value index for periodic translation of historical or original cost into current dollar values, thus producing an "adjusted original cost" for reporting the condition of a business. Though such an accounting concept is not yet accepted, it is finding favor with accountants and, with support from influential groups, might even win favor in Washington, he concluded.

"Today there is a vast amount of research on synthetic liquid fuels, on mechanically mining coal without the use of explosives, on driving railroad locomotives with coal-burning gas turbines, on the use of oxygen in the gasification of coal, on the production of power gas by underground gasification of coal beds, and on new heavy-density media for washing coal and recovering fine coal from washery waste," said Dr. A. C. Fieldner, chief, Fuels Branch, USBM. Dr. Fieldner, who presented a paper prepared jointly with R. L. Brown, USBM, was first speaker at the Tuesday morning session, with David Mitchell, Pennsylvania State College, and J. P. Blair, Heyl & Patterson, Inc., serving as co-chairmen.

Tracing development of coal research in industry-wide, federal, state and individual-company projects and touching briefly on projects recently launched, such as the coal plow and the extensible stainless-steel conveyor belt, Dr. Fieldner declared that the economic significance of these developments and those in prospect is far greater than popularly supposed. Benefits already are noticeable in higher utilization efficiency, better-quality fuel, lower mining costs and new markets for coal—industrial, domestic and chemical—as well as in stretching the Nation's fuel reserves.

Froth-producing cresylic acids have been used extensively for froth flotation of coal but factors affecting their frothability have not been fully known until recently, said Dr. Shiou-Chuan Sun, Penn State College. These factors are as follows:

1. Chemical composition of the various cresylic acids — Low-distillation acids do a better job.
2. Solubility—For effective work, the acids must not be extremely soluble or extremely insoluble.
3. Presence of machine grease and motor oils—These inhibit frothing, though their effects can be partly offset by increased aeration.
4. Aeration—Frothability is inversely proportional to the density of the gas used for aeration.
5. Sphalerite particles — Frothability and stability of froth increase with the percentage of sphalerite particles and with the decrease of particle size.
6. Temperature — The higher the temperature, the better the froth.
7. Rate of aeration—The higher the rate, the higher the froth column.
8. Concentration—Up to a certain

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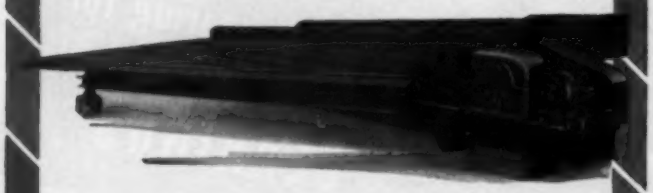

If you want to know the facts about *SuperDuty Diagonal Deck* Coal Washing Tables, ask those who own and use them.

Such operators are not difficult to find. Super-Dutys have been included in almost every important coal cleaning installation since World War II. They are practically "standard equipment" with those who want high grade washed coal products in fine sizes at economical cost. Write today for full information about these efficient coal washing tables. Ask for Bulletin 119.

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point, varying for each of the cresylic acids, frothability increases with concentration of the acid. Beyond this point, however, increasing the concentration is a waste of money.

Unveiling a new-type self-propelled, extensible conveyor for use behind continuous mining machines, C. H. Snyder, president, Sunnyhill Coal Co., New Lexington, Ohio, declared that real continuous mining and transportation now is close at hand. The new Jeffrey-Sunnyhill conveyor called the "Molveyor" moves coal away from a Colmol continuously at rates up to 4 tpm and thus provides uninterrupted intermediate transportation between the mining machine and the main haulage. Up to now continuous miners have operated only intermittently because of delays in intermediate transportation.

The floatability of oxidized coals is determined by the relative balance of loatable and non-floatable components, said Dr. Sun, who presented a second paper at the Tuesday afternoon session, with W. A. Mueller, Ohio State University, and B. W. Gandrud, USBM, presiding jointly.

Describing laboratory methods for oxidizing coals and measuring their floatability, Dr. Sun concluded: (1) the floatability of unoxidized coals decreases in the order of bituminous, subbituminous, anthracite and lignite; (2) floatability generally is lowered (except for lignite which, when partially oxidized, loses enough moisture to increase its floatability) in direct proportion to the extent of oxidation; and (3) floatability is only slightly affected by superficial oxidation. Oxidized coals generally cannot be floated as well as unoxidized coals because the floatable hydrocarbon elements have been driven off and the non-floatable components—water, oxygen and ash—have been relatively increased. In floating oxidized coals, it is advisable to select the reagents with care, since different reagents have different effects on bituminous, anthracite and lignite.

Evaluating coal-washery performance depends first of all upon standardization of methods of measuring performance, said H. F. Yancey, USBM, who presented a paper prepared jointly with M. R. Geer, USBM. Their paper was a critical discussion of criteria for evaluating washery results and had special reference to ideas developed at the First International Conference on Coal Preparation, Paris, France, June, 1950.

With extensive use of tables and charts, Mr. Yancey discussed various methods of judging plant performance, pointing out that the proper method to use is dictated by the purpose of the investigation and the data at hand. Three factors he pointed out, enter into the evaluation: (1) the density of the separation, which is dictated by market or utilization; (2) the character of the raw coal treated, which is determined by the coal itself; and

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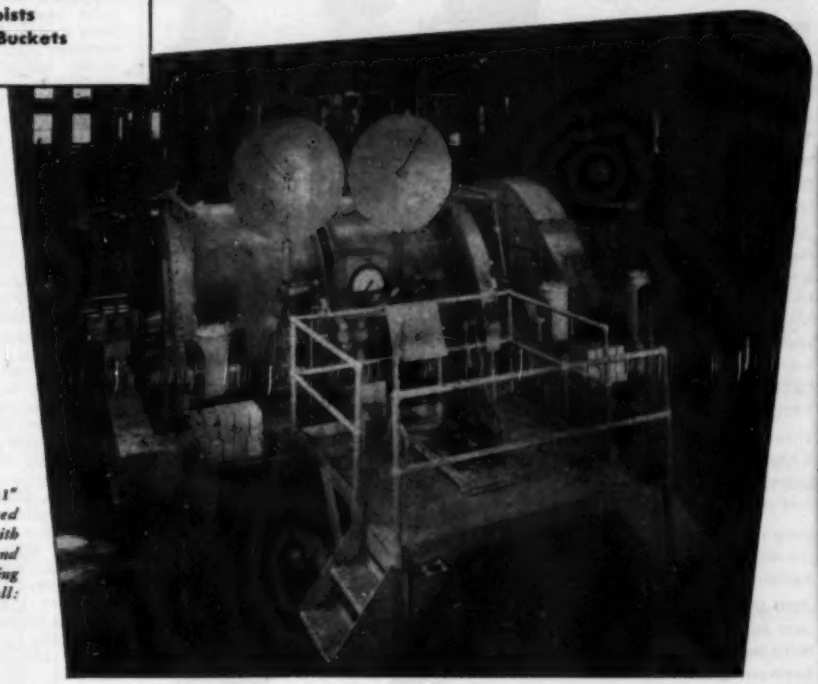

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(3) the sharpness of separation between coal and impurity, which is a characteristic of the plant itself.

The criterion of greatest usefulness is efficiency which being influenced by all three factors is a direct measure of the loss of salable coal. Efficiency, however, must not be confused with error area or probable error, be warned, since low values in error area and probable error often accompany low efficiency. Error area and probable error, both of which show up in a distribution curve for the washing operation, are only measures of the sharpness of separation and are useful in comparing the operation of washery units making different separations. Both error and probable error are substantially independent of the nature of the raw coal and the density of separation.

Time studies and analyses of the reasons for delays indicate that mining efficiency can make vast improvements with conventional equipment and without necessarily converting to continuous-mining equipment, said A. W. Bitner, Penn State College, who presented a paper prepared jointly with A. W. Asman, of the same institution. Even so, Mr. Bitner urged, all mines now should be planned for possible future installation of continuous-mining machines.

Showing breakdowns of time operated, delays and down time, and balancing actual performance against theoretical, he pointed out the usefulness of such data in spotting defects in machines, methods and mine layout, and in boosting efficiency. The studies were based on mines with substantially identical operating conditions but with different mining systems—track, battery-powered shuttle cars and cable-reel shuttle cars. He pointed out, for instance, that loading machines lose more time because of poor voltage than because of inexperienced operators or shuttle-car delays.

Direct approximate methods of comparing the four makes of centrifuges now in use, evolved from data from many installations, were presented by Orville R. Lyons, Republic Steel Corp., the first speaker at the Wednesday morning session, Byron M. Bird, Jeffrey Mfg. Co., and C. C. Wright, Penn State College, presiding jointly.

Elements in the comparison method presented by Mr. Lyons are:

1. Degradation effect, based on the assumption that 100% of degradation in all sizes occurs immediately prior to or immediately after discharge from the centrifuge.

2. Correlation of degradation and particle size, projected from a graph plot showing degradation for a number of closely sized fractions.

3. The size-consist of the degraded material, based on the assumption that breakage in the centrifuge would have the same size distribution as particles of comparable size in the original feed.

Holmes MINE EQUIPMENT NEWS

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NEW LOW-COST THERMAL DRYER

NEW DUSTLESS LABORATORY CRUSHER NOW AVAILABLE

Designed to crush coal samples for testing. Produces samples of uniform size for constant and accurate analysis. Holmes' Laboratory Crushers feature easy accessibility to crushing chamber for cleaning, replacing hammers, and changing screens. Rubber seals eliminate dust leaks. High crushing rate, low initial and operating costs are outstanding.

Automatic Dust-O-Lator Removes Dust and Fines When Loading Trucks

Self-contained units, combining a withdrawal gate, mechanical screen, and automatically controlled power unit, that are adaptable to any type bin for loading trucks. Available for side or bottom discharge. In the Holmes Dust-O-Lator the screening action is positive-automatic—screen motion starts when gate is opened and stops when gate is closed. Models in various sizes for handling egg, nut and stoker coal, as well as lump or run-of-mine sizes.

CUSTOM-DESIGNED SKIPS AND CAGES FOR FASTER LOADING AND DUMPING

Designed and built to suit your requirements, Holmes Skips and Cages can save you time and money. The 464 cu. ft. Overturning-Type Skip Bucket, pictured below, was custom built to meet one mine's specific needs. An inquiry, describing your problem, will bring a Holmes engineer to give you the benefit of their 71 years experience in mine equipment.

CONTINUOUS-FLOW, ONE-PASS THERMAL COAL DRYING WITH BAUGHMAN VERTI-VANE DRYER

Above cut-away view of Baughman Verti-Vane Dryer shows how continuous flow of coal assures thorough drying, with a minimum of degradation, in a one-pass operation.

Uniform, Controlled Drying For Large and Small-Scale Operations

Outstanding in price performance, Baughman Verti-Vane Dryers give the best in high-quality operation with comparatively low initial cost. Each unit designed for capacities ranging from 15 to 75 tons per hour, and will handle all coal sizes from 1¼" down—reducing surface moisture to approximately 2% in a "one-pass" operation—delivering a uniformly dried and well mixed product with practically no degradation. Multiple unit installations are recommended for large-scale operations. Simplicity of design, rugged construction, a minimum of moving parts, and slow operating speed tend to eliminate shift breakdown and keep replacement costs to a minimum. Controls easily adjusted to feed conditions. Write for Catalog No. 101.

AVOID COAL BREAKAGE WITH HOLMES LOWERING SPIRALS

Designed to take the material from the conveyor and carry it gently to the bottom of the bin or silo, Holmes Lowering Spirals keep the product true in size and minimize degradation. Regardless of the distance material travels, its velocity remains uniform; reaching the bottom in a continuous, even stream—sliding onto the peak of the pile without droppage.

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This is the pump with the deep stuffing box under suction pressure only. Entrance of grit into stuffing box is minimized —slurry dilution from stuffing box leakage negligible. The pump requires only nominal sealing water pressure, yet can operate under high vacuum as well as high suction heads. Because of this design, stuffing box troubles are practically eliminated.

The Morris Type "R" — built for handling refuse, sludge, tailings, concentrates, coal, ore and other mineral slurries — can be used to advantage in both non-metallic and metallic mines and mills. For long term efficiency and economy — and a minimum of maintenance and shutdowns — specify Morris Type "R" Slurry Pump.

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MORRIS Centrifugal Pumps

AIME Coal Division

4. Correlation of average particle size and surface moisture.

With this method, Mr. Lyons compared the four centrifuges in terms of degradation, cake moisture, closed-system cake moisture and capacity. He warned, however, that the results obtained are for only one set of assumptions and that each dewatering problem should be analyzed individually.

Formation of acid mine water may possibly be slowed down by keeping mine roof in good condition, said K. L. Temple, who presented a paper prepared in collaboration with A. R. Colmer and W. A. Koehler, his colleagues at West Virginia University. Bacteria that grow and reproduce by oxidizing sulfur or sulfur compounds have been found in all acid mine water tested. These bacteria apparently form sulfuric acid and ferric oxide. The greatest quantity of acid mine water appears to occur where sulfur balls, sulfur-bearing shale, sulfate materials and rider coal are present. Also, acid mine water appears to form after the roof strata are broken. It follows, therefore, that some means of controlling roof after mining might inhibit formation of acid mine water.

Cyclone thickeners have proved their merit in a closed water circuit at the Clairton plant, U. S. Steel Co., said Victor Phillips and J. P. Blair, both of Heyl & Patterson, Inc. Mr. Phillips presented the jointly prepared paper. Lack of storage area for plant slurry and strict laws against stream pollution, together with heavier loading of the plant which taxed capacity of the existing water-clarification system, led to installation of a parallel clarification circuit to take over nearly half of the load. The new circuit, supplementing the old system of two 70-ft-diameter thickeners and two 700-sq-ft vacuum filters, consists of five 14-in cyclone thickeners and 110 3-in cyclone thickeners in five batteries of 22 each, plus a vacuum-disk filter to recover solids. The new system was installed without adding to plant space.

The cyclones are lined with abrasion-resistant rubber. Major wear occurs at the discharge end, where the cone-shaped thickeners narrow to a neck. Results of the installation have been: (1) improvement in concentration of solids; (2) elimination of fluctuations; (3) reduction of shutdown and cleaning time; and (4) uniformity of circulating water. Cyclones now can be accepted as proven, useful tools for recovery of solids and clarification of water in preparation plants, the authors concluded.

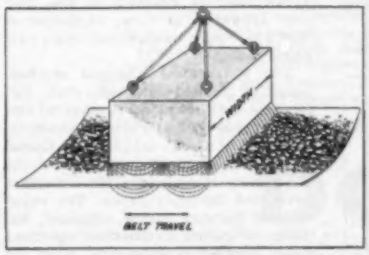
Knowledge of petrographic composition of coals and their suitability for chemical uses may possibly be obtained by an oxidation method, said R. Q. Shotts, University of Alabama. Mr. Shotts was the first speaker at the Wednesday afternoon session, H. F. Yancey, USBM, and C. G. Ball, Paul Weir Co., serving as co-chairmen.

In developing the oxidation method,

LOOK AT THAT AIR GAP — a large midwest coal plant reports extremely effective iron removal from the Dings Deep Burden Rectangular shown.

POWER that searches down 18" to YANK tramp iron OUT!

SPECTACULAR EVIDENCE OF POWER — a Dings Rectangular easily hoists an auto.



Evenly distributed edge-to-edge flux pattern as diagrammed is big reason for choosing rectangular over circular magnets. For this reason Dings builds other rectangulars which while not as powerful as the Heavy Burden Magnet above are effective at distances up to 12" and have found wide application in the coal industry.

—DINGS Heavy Burden Rectangular Suspended Magnet

HERE'S power that will effectively penetrate through 18" of space and coal — and come up with tramp iron — power that in a factory test jerked a 1500-lb. steel channel through a 22" air gap!

In short, it's the most powerful tramp iron magnet built.

This is the magnet to use on your tough jobs — the high belt speeds, the deep burdens — the places where tramp iron damage to machinery means DOWN TIME. Throw in the fact that you're shipping iron free coal and you have the reasons why case records have shown Dings Rectangular Magnets have paid for themselves in less than a year. Dings Magnetic Separator Co., 4720 W. Electric Ave., Milwaukee 46, Wisconsin.

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Catalog 301-A describes Dings Rectangular Suspended Magnets in details you'll want to know about. It's free. Send for it today.

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A self-contained automatic conveyor scale, combined with automatic gate to give feed rate control. Powered feed regulator operates gate, without restraint on scale beam. Feed rate may be varied. Large feed opening insures even flow. Uniformly feeds bulk material BY WEIGHT; and automatically totalizes weight of materials fed. Durable. Simple to operate. Rugged, heavy duty design. Slow moving parts means long life. Easy to install and maintain.

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AIME Coal Division

Mr. Shotts separated several Alabama coals into specific - gravity fractions and oxidized samples of each fraction in 8N nitric acid for seven different time periods. He found that the quantity of dry, ash-free residue at the end of any given oxidation period decreased and the specific reaction rate increased with decreasing density of the fraction.

Extrapolation from logarithmic plots of coal concentration against time yielded estimates of the percentage of each coal component present and made it possible to calculate the specific reaction rate of each component. Though further studies must be made, it is possible that specific reaction rates may prove a better criterion of coal rank than currently-used chemical analyses, Mr. Shotts suggested.

Accurate information on coal reserves must be obtained through a continuing survey in advance of the time when coal will be needed to replace shrinking reserves of oil and natural gas, declared Paul Averitt, U. S. Geological Survey. Yet in many coal-bearing states, information on coal reserves is scattered, inadequate and unsatisfactory.

To obtain the information needed, there must be a uniform policy and procedure for studying, calculating and reporting reserves. A start already has been made by federal and state agencies, Mr. Averitt reported. In 1950, summary studies were completed for three states and similar studies were launched in other states. Within a year, good information will be available for 10 states.

Investigations also are proceeding on the location and extent of coking-coal reserves and on coal beds suitable for use by synthetic-liquid-fuel plants. In the last 2 yr, more work has been done on reserves than at any time since 1909-13. The general result of current surveys is to reduce previous estimates, he pointed out.

Serious problems of support, leakage and sloughing created by mining usually can be solved only by expensive and difficult methods said S. S. Philbrick, U. S. Army Engineers. Recognition of the cyclic structure of the overlying rocks may help engineers treat these problems successfully, particularly in construction excavations, railroad cuts and dam building.

Disintegration of mine roof often is attributable to oxidation, said C. T. Holland, Virginia Polytechnic Institute. This may occur wherever there are materials capable of oxidation. In shales, which most often overlie coal seams, oxidizable materials have been found in the following quantities:

Pyritic sulfur	0.5 to 5.5%
Carbon dioxide	0 to 4%
Iron	0.4 to 7.1%
Silica	33.6 to 63.0%
Aluminum oxide	13.9 to 28.8%

Formation of ferrous sulfate causes a swelling action that weakens roof and formation of sulfuric acid speeds roof disintegration, Dr. Holland said. These and other oxidation effects have been shown to penetrate roof about 6 in in the first year of exposure and an additional 3 in in the second year. Such oxidation reduces compression, shearing and breaking strength in roof strata. In view of these harmful effects, air - conditioning of mines, which is being undertaken in some areas, may be harmful in the long run. Likewise, in time, oxidation of roof shale may weaken roof bolts now being installed.

The differential - thermal method, based on measuring temperature differences between an inert material and coal, may serve to determine the heating value of a coal, said Carl M. Gamel Jr. and W. J. Smothers, both of the University of Arkansas. Mr. Smothers presented the joint paper. The shape of the thermal curves obtained, besides indicating exothermic reactions upon heating crushed coal with the inert material (alumina), gave also some indication of the reactions taking place. These reactions varied with the concentration of coal, the particle size and the heating rate. Over the range of values studied, there was good correlation of the areas under the differential exothermic curves and the heating values of the coals as shown by the peroxide bomb.

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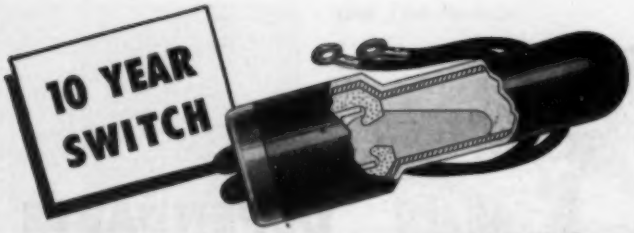

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Association Activities

Western Pennsylvania Coal Operators' Association, at its annual meeting held in Pittsburgh March 6, elected new officers, as follows: G. A. Shoemaker, president; Charles B. Baton, vice president; Harry A. Sutter, executive vice president; M. C. Briggs, treasurer; Earl Glass, secretary; and R. W. McKown, traffic manager. Newly elected directors of the association, in addition to Messrs. Shoemaker and Baton, are: J. Allan Brookes, F. H. Coleman, J. M. Connor, J. E. Elkin, H. C. Goodhart, Wenman A. Hicks, Ralph E. Jamison, W. A. McBride, C. C. McGregor, C. W. Pollock, Walter F. Schulten, E. A. Siemon and F. G. West. Messrs. Baton, Jamison, McBride, McGregor, Shoemaker and West were elected members of the executive committee.

Big Sandy Elkhorn Coal Mining Institute, at a recent meeting in Pikeville, Ky., elected as president, C. L. Sherman, superintendent, Stephens Elkhorn Fuel Corp., Manton, Ky., succeeding John L. Coyer, superintendent, Republic Steel Corp., Road Fork, Ky. Newly named vice presidents were: Ballard Plummer, Princess-Elkhorn Coal Co.; A. M. Ayers, Russell Fork Coal Co.; and M. E. Prunty, Consolidation Coal Co. (Ky.). J. H. Mosgrove, Pikeville, was re-elected secretary-treasurer. Directors elected were: J. T. Parker and Arthur Bradbury, Inland Steel Co.; M. K. Reed, Liberty Elkhorn Mining Co.; J. E. Green, Utilities - Elkhorn Coal Co.; Edgar Dale and James Fleming, The Elk Horn Coal Corp.; V. A. Hensley, EG&FA; B. F. Gish, South-East Coal Co.; John L. Coyer, Republic Steel Corp.; Harry McCarty, Clear Branch Mining Co.; George H. Evans Jr., Glo Valley Coal Corp.; Ward Reed, Turner-Elkhorn Mining Co.; J. C. Dann and Seth Kegan, Consolidation Coal Co. (Ky.); and Fred Sherman, North-East Coal Co.

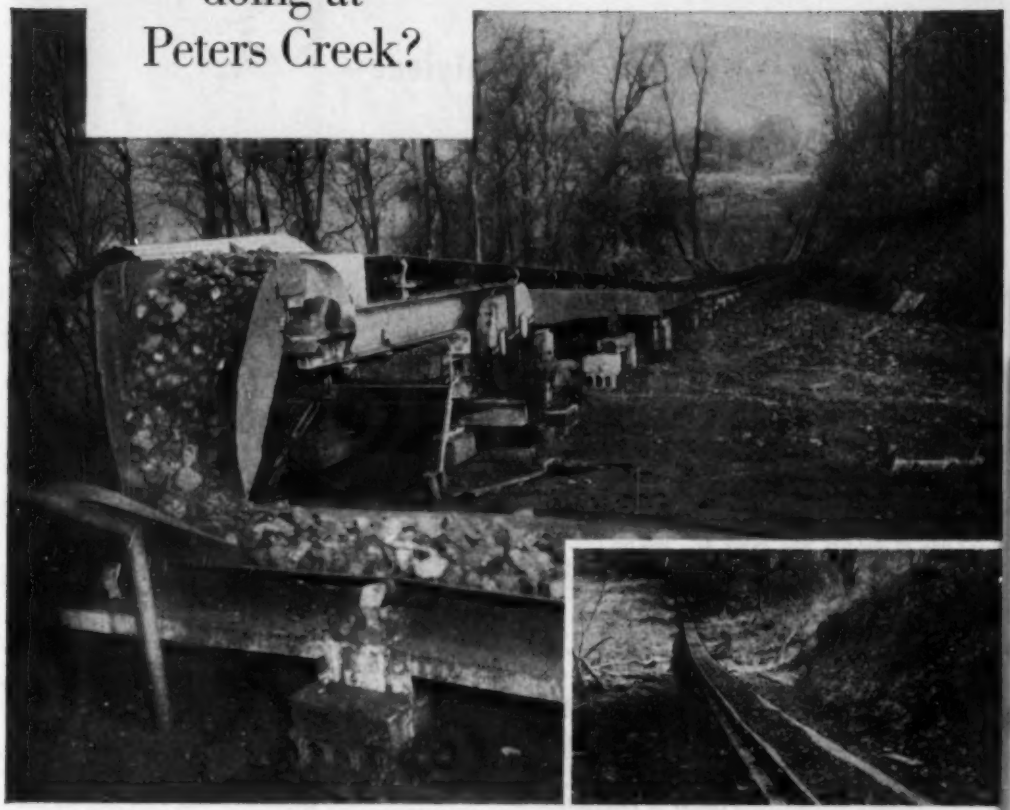
Private Plants Urged For Synthetic Liquid Fuels

Secretary of the Interior Oscar L. Chapman recently announced that he is calling upon private enterprise, with government assistance under existing legislation, to establish promptly a synthetic-liquid-fuels industry based upon coal and oil shale. He made this disclosure in transmitting to the Congress a report on Bureau of Mines synthetic-liquid-fuels research during 1950.

The Secretary pledged the "full support" of the Department of the Interior to "competent organizations or groups of organizations" offering sound proposals for undertaking commercial oil-shale operations.

He added that the Department will also encourage the construction of one or two plants to produce syn-

What's U.S. Rubber doing at Peters Creek?



Large photo shows coal being transferred from one belt of 3100' centers to belt of 1700' centers. Small photo shows section of the 3100'-center belt. Note the troughability and excellent training.

ITS BELTS are carrying 300 tons of crushed coal per hour. These belts, three in number, are known as U.S. Giant 4-ply Style XN Conveyor belts, of patented nylon construction. They connect the crusher to the tipple of Peters Creek coal mine. The belts replaced 10-ton trucks which always became mired in winter mud. This unusual conveyor installation provides a steady, dependable flow of coal over hills and through valleys, saving trucking and handling.

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Here the 1700' center belt carries the coal along to the tipple. Note how it "contours" or hugs the terrain, taking the straightest possible course to its destination.

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COAL MEN ON THE JOB

SPRUCE RIVER COAL CO., Ramage, W. Va.: J. C. Spragg (left), cashier, and John Bryson, chief engineer.

thetic liquid fuels by direct hydrogenation of coal. Regarding the other coal-to-oil process being studied by the Bureau of Mines—gas synthesis—he observed that further pilot plant and demonstration plant testing is necessary.

Citing increasing need for petroleum products in this country, the uncertain international situation threatening imports, and the heavy costs of discovering and developing new oil fields, Secretary Chapman said that prompt synthetic fuel development is essential to safeguard our oil supply.

He also stated that research conducted by private industry and the USBM since 1944 makes it apparent that establishing the initial plants would involve little financial risk to the government or industry. To neglect the initiation of a synthetic-liquid-fuels industry, he said, is "to close our eyes and minds to our own resources at a time when they are critically needed."

Technological advances during the past year, Secretary Chapman said, have brought the mining and retorting of oil shale and the refining of shale oil to the point where pushing forward a program for utilizing this resource is "in the best national interest." If the prices of aromatic chemicals continue to rise, he declared, the construction of one or two coal-hydrogenation plants will be "a most profitable business venture."

The four-volume report submitted by the Secretary covers every phase of the government's research program. Separate volumes are devoted to the three sources of such fuels being investigated—coal, oil shale, and agricultural residues—and to studies aimed at increasing the Nation's oil resources by developing more effective methods of secondary recovery of natural petroleum from stripper fields.

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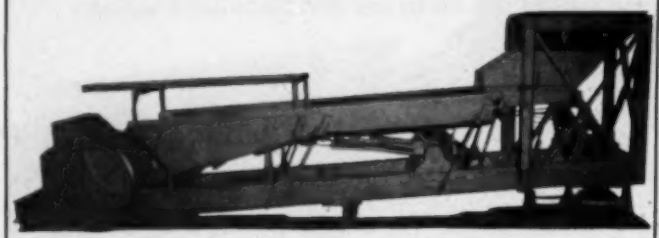

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The unit is equipped with magnetic starters and push-button controls, 10 to 15 HP motor on the crusher, 5 HP motor on the screen and picking table. It can be readily transported from one location to another on a standard long-wheelbase truck, with minimum cost for moving and erecting.

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R.I. 4770, Part I—Oil From Coal. R.I. 4771, Part II—Oil From Oil Shale. R.I. 4772, Part III—Liquid Fuels From Agricultural Residues. R.I. 4773, Part IV—Oil From Secondary Recovery and Refining.

In the first volume, the government's progress to date and plans for the continued development of processes for the economic production of oil from coal is summarized. Among the activities covered are: the coal-hydrogenation demonstration plant experimentally operated for 1½ yr, and the nearly completed gas-synthesis demonstration plant, at Louisiana, Mo.; laboratory and pilot-plant research at Bruceton and Pittsburgh, Pa., which has studied synthesis of the products of gasification, direct hydrogenation and fluidized coal hydrogenation; synthesis-gas laboratory tests using pulverized coal at Morgantown, W. Va.; and underground gasification of coal at Gorgas, Ala.

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Other Books and Booklets

ASTM Manual on Quality Control of Materials (STP 15-C). Replaces the ASTM Manual on Presentation of Data. Three parts: I—Presentation of Data; II—Limits of Uncertainty of an Observed Average; III—Control-Chart Method of Analysis and Methods for Presenting Data. 100 pp. Paper. $1.75. American Society for Testing Materials, 1916 Race St., Philadelphia 3.

Comparative Yearly Costs of Heating a Building With Various Fuels. A pocket-size chart comparing costs of heating with anthracite with costs of heating with oil and natural and manufactured gas. 6 pp. 4x8-in; paper. Free. Anthracite Institute, Wilkes-Barre, Pa.

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The Efficiency of Bituminous-Coal-Burning Space Heaters, by J. W. Tieman and F. L. Bagby. A study of the performance of four commercial space heaters when burning high-volatile bituminous. 7 pp. 8½x11-in; paper. Free. Bituminous Coal Research, Inc., 2609 First National Bank Building, Pittsburgh 22, Pa.

Mineral Resource Research and Activities of the State Geological Survey, 1948-49, by M. M. Leighton. Annual report on Illinois coal and other minerals. 28 pp. 6x9-in; paper. No price quoted. Illinois State Geological Survey, Urbana, Ill.

The following publications by the Bureau of Mines may be obtained free upon request to Publications Distribution Section, 4800 Forbes St., Pittsburgh 13, Pa. All are 8x10½-in; paper; mimeo.

Laboratory-Scale Work on Synthesis-Gas Production, by J. J. S. Sebastian, P. W. Edeburn, F. Bonar, L. W. Bonifield and L. D. Schmidt. R. I. 4742. 41 pp.

Preparation Characteristics of Coal Occurring in Indiana County, Pa., by W. L. Crentz, Fern Steele and A. L. Bailey. R. I. 4763. 33 pp.

Design, Construction and Operation of a Distillation Laboratory for the Synthetic Liquid Fuels Program, by J. Feldman, P. and G. Pantazoplos and M. Orchin. R. I. 4764.

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Bellevue Coal Co., Diamond Breaker, Scranton, Pa.—Contract closed with Western Machinery Co. for washing-plant additions, including a No. 3C Wemco Mobil-Mill heavy-media separation plant using a 6x5-ft Wemco drum separator, to wash approximately 70 tph of 1⅝x⅜-in coal.

Premier Pocahontas Coal Co., Herndon, W. Va.—Contract closed with Western Machinery Co. for a No. 4C Wemco Mobil-Mill heavy-media separation plant, including a completely prefabricated feed-preparation section for wet-washing of coal; minus ¼-in fines to be dewatered with a No. 36 Wemco coal spiral; feed to preparation section to be 150 tph of 6x0, with approximately 100 tph of 6x¼ flowing to the Mobil-Mill circuit; in the 8-ft-diameter by 10-ft-long Wemco 2-compartment drum separator, coal fed to the first compartment will produce clean coal, the sink automatically flowing to the second where refuse and middlings will be produced as sink and float products, respectively; either the refuse or middlings product, or any part thereof, may be recirculated through size-reduction units for a second pass through the Wemco unit.

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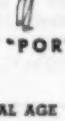
There's a big difference in Hydraulic Jacks! Construction, mining and industrial men discover that Blackhawk Jacks last longer, serve better. It's the world's most complete line of Hydraulic Jack Equipment. And every model (1½ to 100-ton) is *one-man* operated. Order from your supply house. Write for catalogs, Blackhawk Mfg. Co., Dept. J-4541, Milwaukee 1, Wis.



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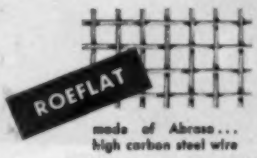
"PORTO-POWER" • PIPE BENDERS • WRENCHES

VISIT US AT BOOTH 321, CLEVELAND, OHIO MAY 14-17

AGGREGATE WIRE SCREENS

Roebling offers the right metal or alloy for extra economy



made of Abraso... high carbon steel wire

made of Roetemp... oil-tempered steel wire

available in stainless steel, monel and other alloys

WHETHER ROEBLING ROEFLAT or some other construction best meets your screening requirements, Roebling goes a long step farther... offers you each and every construction in the exact metal or alloy to bring maximum screen life and economy in your operations.

As one example, the vastly increased working life afforded by Roebling Roeflat's unique construction can be boosted still further by adopting Abraso, for its high resistance to vibration fatigue; Roetemp, for abrasion and fatigue resistance; stainless steel, monel or other alloys to overcome corrosion problems.

Get the whole Roebling Aggregate Screens story... write for Catalog W-903.

WOVEN WIRE FABRICS DIVISION

John A. Roebling's Sons Company
Roebling, New Jersey

Woven Wire Fabrics Division
John A. Roebling's Sons Co., Roebling, N. J.
Gentlemen: Please send me free copy of Catalog W-903 giving up-to-the-minute information about Aggregate Screens.

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Company.....
Address.....
City.....State.....

ROEBLING

GUNDLACH COAL CRUSHER ANSWERS SIZING PROBLEM

PEP COAL CO. INSTALLATION
NEW ATHENS, ILL.

- . . . size of the stoker coal can be changed while the crusher is in operation.
- makes a very small per-cent of carbon
- operates with almost no noise
- no vibrations whatsoever

A letter from Mr. Walter J. Lehr, of the Pep Coal Company, states—"Since installation of your Gundlach Crusher, our sizing problems are licked . . . you can change size without stopping production . . . makes small per cent carbon . . . very little noise . . . no vibration."

This letter is typical of the many received from satisfied Gundlach Crusher owners.

WRITE FOR CRUSHER BULLETIN C A

T. J. GUNDLACH Machine Co.
Belleville, Ill.

Built for long service . . .
Shaker Conveyor Troughs and Ball Frames

The special high carbon steel of which Hendrick Shaker Conveyor Troughs are made, offers great resistance to abrasion and to bending or breaking under weight of the coal. The sides of the troughs are so shaped that they give maximum resistance to buckling.

Outstanding for accurate and uniform construction, Hendrick Conveyor Troughs are made in standard lengths of 10 feet, and 10 feet, 2 inches, but can be furnished in any desired length up to 13 feet, 2 inches.

Hendrick Ball Frames give troughs substantial support whatever the floor conditions. Write for full information.

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Manufacturing Company

Perforated Metals
Perforated Metal Screens
Wedge-Slot Screens
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Mitco Open Steel Flooring
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41 DUNDAFF STREET, CARBONDALE, PENNA.

Sales Offices In Principal Cities

Johannesburg, S. A.—Contract closed with Jeffrey Mfg. Co. for one 7-ft 3-compartment 8-cell Baum jig; capacity, 450 tph of 8x0-in coal.

Douglas Colliery, Ltd., Johannesburg, S. A.—Contract closed with Jeffrey Mfg. Co. for two 7-ft 3-compartment 8-cell Baum jigs; capacity, 900 tph of 8x0-in coal.

Gilberton Coal Co., Gilberton, Pa.—Contract closed with Wilmot Engineering Co. for one 12-ft-diameter froth-flotation unit for preparing minus $\frac{3}{16}$-in to plus 100-mesh coal; feed capacity, 45 tph.

Locust Valley Coal Co., Mahanoy City, Pa.—Contract closed with Wilmot Engineering Co. for one 9-ft-diameter froth-floating unit for preparing minus $\frac{3}{16}$-in to plus 100-mesh coal; feed capacity, 30 tph.

William Aloe Coal Co., Imperial, Pa.—Contract closed with Western Machinery Co. for a No. 3C Wemco Mobil-Mill equipped with a 8x5-ft Wemco drum separator; installaiton to include a 150-tph feed-preparation circuit with a No. 36 Wemco coal spiral, with 100 tph sized at 4x$\frac{3}{8}$ in to serve as heavy-media feed to the Mobil-Mill.

Foreign Developments

British Miners' Free Coal Up

More than 5,000,000 tons of coal yearly—or 13% of the total domestic consumption in fuel-short Great Britain—now is distributed free, or at very low rates, to British coal miners under current wage agreements, it was reported in the House of Commons March 17. The fact that the miners get about 10 tons each while the average family is rationed to around 2 tons yearly has evoked much criticism but because of political reasons no immediate action is anticipated. Miners sell free coal they do not use back to the government. Paying miners more wages to compensate for lower coal grants would not be welcomed since wages would be subject to taxes, while the coal is not.

Six Western European Nations Set to Pool Coal and Steel

A draft treaty of the Schuman plan putting the coal and steel industries of Western Europe under a single authority was initialed March 19 by delegates of the six nations participating. While still subject to the

it's "KNOW HOW" that counts

Yes, it takes "know-how" to help save lives, and reduce the frequency and severity of mining accidents. Bituminous Safety Engineers have that "know-how" . . . they are trained, skilled men who combine laboratory and field work to provide complete mine safety for Bituminous Workmen's Compensation policyholders. Their Safety Engineering Program consists of regular mine inspections . . . analysis of mine hazards . . . survey recommendations . . . accident prevention activities . . . reduction of operating expenses resulting from accidents . . . and establishment of production efficiency.

Bituminous Safety Engineers serve mine owners, operators and workers alike with their Safety Engineering Program.

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BITUMINOUS CASUALTY CORPORATION
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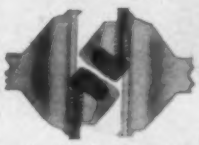
GET THIS FREE BOOK ON SAFE CAR COUPLERS

• You can't beat *safe* American Couplers for today's big cars and longer trains. Heads are husky, one-piece steel castings which *enclose and protect* locking parts. Buffing exerts no side pressure. It is taken by sturdy flanges, without impact on the lock. Pull is transmitted through steel-to-steel contacts—*not* through the lock pivot pins.

SELF-CENTERING, SELF-LEVELING . . . WON'T "SNAG"

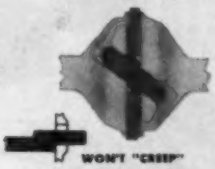
You get extra-wide gathering range—5" axial displacement or 60° angularity, *horizontally;* 2⅞" displacement or 18° angularity, *vertically.* Locks grip tightly—prevent slack and costly wear. You can rotary-dump *without* uncoupling; unlock from either side. Get the utmost in safety and savings now! *Standardize on* American Automatic Mine Car Couplers.

ALWAYS READY TO COUPLE



Any two heads couple—and they're always ready to couple, because locks pivot freely in uncoupled heads. Movement of lock-control bar remains unrestricted until flanges of two heads come together.

HOW AMERICAN COUPLERS LOCK



WON'T "CREEP"

As pivoted locks swing into engagement, each control bar drops to lock against the flange of opposite head.

LOCK-SET FOR UNCOUPLING

Lifting and pulling either control bar unlocks the coupler and holds lock in lock-set position until heads move apart.

Safe...Sure AMERICAN MINE CAR COUPLERS

AMERICAN STEEL FOUNDRIES, 410 N. MICHIGAN AVE., CHICAGO 11, ILL.

ATLAS

STORAGE BATTERY LOCOMOTIVES

are more efficient than any other . . S-B Locomotive

7 TON
42" HIGH
PERMISSIBLE

Approved by the Bureau of Mines for gassy locations.

Atlas Permissible Locomotives have long been famous for dependability and their ability to out-perform all others. Maintenance costs are notably low. These permissibles provide the ultimate in safety and accessibility.

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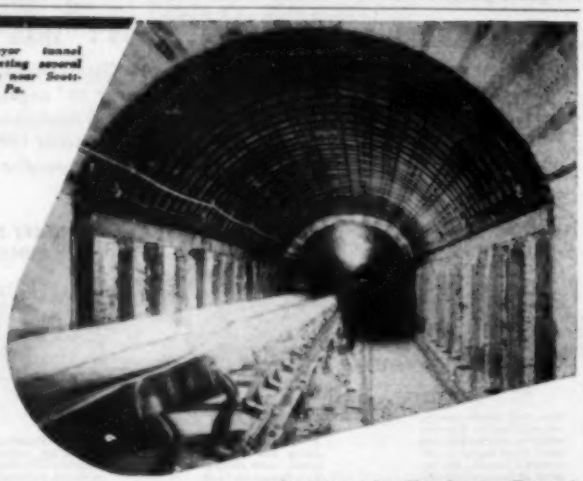
Conveyor tunnel connecting several mines near Scottdale, Pa.



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COMMERCIAL Liner Plate and Steel Tunnel Supports

In main entries, like the one illustrated, steel liner plate with steel tunnel supports make this a dependable construction for year after year operation. Their quick and easy installation by unskilled labor makes this an ideal system for the varied conditions encountered in mines.
Consult a Commercial Engineer on your mine construction.

THE COMMERCIAL SHEARING AND STAMPING CO.
YOUNGSTOWN 1, OHIO

formal approval of the parliaments of the six countries, the 50-yr agreement will combine the two basic industries of the six nations into a single market area on an equal economic basis, with equal access to available resources, expansion of production and raising of the standards of living among the primary objectives. In addition to linking West Germany and France and giving France access to the Ruhr output, the plan will eliminate cartels, tariffs or other trade restrictions, state subsidiaries and market discrimination. The countries participating are France, West Germany, Belgium, The Netherlands, Italy and Luxembourg.

Rail Hike and Natural Gas to Hit Canadian Coal Industry

Higher freight rates on coal now proposed will destroy the coal-mining industry in British Columbia and wipe out jobs for 12,000 miners, C. H. Mitchell, secretary of the Mining Association of British Columbia, recently stated. Mr. Mitchell maintained that coal mines in both British Columbia and Alberta could not face additional freight charges and that the responsibility for saving the industry rested with the Federal Government.

He pointed out that United States mines now sell coal valued at $250,000,000 per year to Ontario. Access to this market for western coal through lower freight rates would mean economic security for Canadian mines.

The possibility that natural gas would further threaten Canadian coal production was indicated March 9 as the House of Commons approved incorporation of a company planning a 3,100-mi $250,000,000 natural-gas pipeline from Alberta to Montreal. The bill incorporating Trans-Canada Pipe Lines, Ltd., already had passed the Senate. The Maritimes now supply about 1,500,000 tons of coal a year to Montreal and Quebec.

BCR Annual Meeting Views Coal's Opportunities

Begins on p 130

little use." To disseminate this data, BCR could prepare, if desired, an effective series of publications as "BCR Aids to Industry" that would serve as a major source of technical information for industry representatives and customers, he said.

Three new BCR directors were elected during the meeting, as follows: Joseph Pursglove, Jr., vice president-research and development, Pittsburgh Consolidation Coal Co., Pittsburgh; David Roberts III, general manager, Brilliant Coal Co., Birmingham; and R. B. Williamson, vice president, Eastern Coal Sales Corp., Bluefield, W. Va. It also was announced that NCA directors had named J. N. Geyer, production engineer, Imperial Coal Corp., Johnstown, Pa., a Class A di-

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ALL OVER

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Large spaces warm up in a hurry all over with an E. K. Campbell furnace fan system on the job. And costs go down!

Equipment and proper heating results are guaranteed—many highly successful coal field installations are in use today. First cost, operating and maintenance costs are surprisingly low.

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... the new separable
FLEXCO HINGED
BELT FASTENERS

U. S. Patent No. 2,477,885

- For joining underground extension conveyors.
- A FLEXCO fastener that is HINGED. Has removable hinge pin.
- Troughs naturally, operates smoothly through take-up pulleys.
- Strong, durable . . . pull or tension is distributed uniformly across joint.
- For conveyor belts 3/16" to 1/2" thick.

Order From Your Supply House. Ask for Bulletin HF 500.

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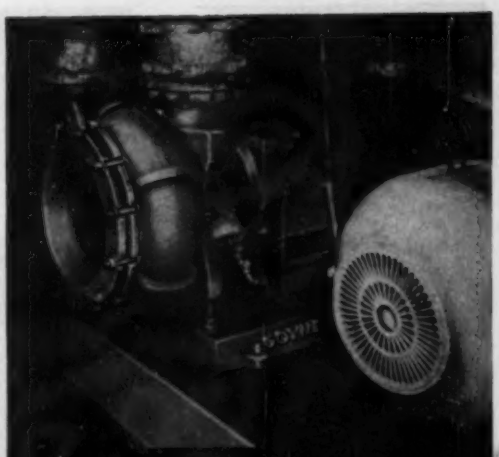

GOYNE
SOLIDS HANDLING PUMP

Feature:
LOW-COST
OPERATION

GOYNE SOLIDS HANDLING PUMPS are extremely popular with a very large number of coal companies who find them quite reliable for pumping:

Liquids with solids added to increase specific gravities for coal and refuse separation in coal preparation plants.

Disposing of refuse and silt by pumping to waste material banks or for back filling into mined out areas.

Pumping prepared coal to temporarily desired storage areas.

These specially designed Goyne pumps incorporate numerous features to reduce upkeep and labor maintenance costs to a minimum:

1. Ease of inspection of all wearing parts. All internal portions are immediately accessible after removing *only the rear head of the pump.* No suction or discharge piping or any other major part of the pump is disturbed.

2. The only packing box of the pump is subjected to the low suction pressure rather than to the discharge pressure developed by the pump. This feature assures long packing and shaft sleeve life.

3. Impeller clearance is adjusted while the pump is running, insuring constant pump capacity so essential for uniform washing.

4. There are twenty-eight possible nozzle assembly combinations for each standard pump. Washery designers like this "adaptability feature" as it helps them out of tight places and simplifies piping.

5. Spare parts are carried in stock at our plant for prompt shipment. Reduce your inventory by using Goyne Process Pumps.

All inquiries are given a thorough engineering analysis and our prompt attention.

GOYNE MINE PUMPS 1881

The GOYNE STEAM PUMP CO.
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Pick this Lightweight for Heavyweight drilling!
Like all Acker Drills, this lightweight husky was designed and built to operate under the most rugged conditions.
If you are looking for a quality drill that will give you years of trouble-free operation—you want the Acker Teredo.
Over 30 years of experience in the design and manufacture of drilling equipment is the big reason why Acker Drills stand-up year after year, job after job. Write for Bulletin 33. CA
The NEW ACKER TEREDO DRILL
ACKER DRILL CO., INC.
SCRANTON 3, PA.

CUSTOM BUILT CONTROL FOR MINES
Photograph illustrates 50-75 HP, 230-volt, Explosion-tested starter.
★ ENSIGN-CLARK starters are designed to meet the exacting requirements of mining service.
★ Rugged enclosures with heat-treated aluminum covers—accessible for maintenance—oversize contacts are standard features.
VISIT US AT THE CLEVELAND SHOW
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BCR Annual Meeting

rector of BCR to replace C. J. Potter, president, Rochester & Pittsburgh Coal Co., resigned. At a meeting of the board of directors following the general session, all officers of BCR were re-elected.

For any substantial reduction in mining costs, "we must take an entirely new approach to the problem: we must turn to research," said M. Albert Evans, in discussing "Lower Cost Coal to Meet Competition." Mr. Evans, assistant to the vice president, EG&FA, and a member of the BCR Mining Development Committee, opened the general meeting, with Dr. A. A. Potter, BCR president, presiding.

The greatest and quickest return from research investment and efforts will be secured in the field of "Direct Mining," or face operations, as contrasted with "Service Mining," Mr. Evans emphasized. Citing man-day output figures secured from a 1949 survey of service operations and the 1948 published statistics on underground mines, Mr. Evans said that the national average of 17.6 tpm for service mining could be increased to 20 tpm in most instances by the application of known engineering principles, yet this addition of 2.4 tpm reduces operating costs only 12c a ton, based on an average daily wage of $17.60.

On the other hand, an improvement in direct mining of 2.6 tpm from the national average of 7.4 to 10 tpm reduced operating costs 63c a ton," and an additional boost of 5 tpm would further reduce operating costs 57c a ton, or a total of $1.20 a ton, Mr. Evans explained. Additional improvements from 15 to 20 tpm and from 20 to 30 tpm would reduce costs by only 29 and 30c a ton, respectively.

The four face operations, cutting, drilling, shooting and loading, ordinarily offer the greatest potentialities for cost reduction and the first effort should be directed toward them. Consequently, the MDC's initial work has been directed toward development of a continuous-mining machine — a machine that would perform all four face operations and would (1) operate under mining systems common to the industry; (2) not create new cleaning or marketing problems; (3) have strength and simplicity in mechanical design; and (4) offer flexibility for varying seam conditions.

MDC Test Unit No. 2 is about ready to be placed in a mine for trial and while much designing time was consumed in working out the mechanical problems of obtaining flexibility and packaging power, many of the originations stemming from its development will have considerable value to the industry for future design of continuous machines and improvement of present machines, Mr. Evans reported.

The coal industry knows that to achieve progress, "more men, more working places, more mine cars, are not enough." Citing Henry Ford's

"Sutton" SAND DRYING STOVES

The Standard for Over Forty Years

Burns Any Type of Fuel

The "Sutton" Sand Dryer may be fired with any type of fuel. While most "Sutton" Sand Dryers are equipped to burn coal, they can be furnished with burners for natural gas or fuel oil.

"SUTTON" FEATURES

- Simple in operation
- No skilled labor necessary
- Made in four sizes
- Lowest original cost
- Economical upkeep
- Topmost efficiency

SATISFACTION GUARANTEED

Catalog and Prices sent upon request

INDIANA FOUNDRY COMPANY

950 Oak Street — Indiana, Pa.

Standby Storage at the Pit

While waiting for gondolas to be spotted, coal can be accumulated in the NEFF & FRY Storage Bin. The bin illustrated here will hold 4 1/3 carloads, which is about a day's output from this particular mine.

Another use for the bin is to build up an advance supply of coal in case a stoppage of operations for repairs is anticipated. Considering the advantages of this standby storage, the cost of the NEFF & FRY Bin is insignificant. And it's the right type of bin to install because N. & F. structures are strong and enduring. The Super-Concrete Staves are formed under 140 tons pressure, giving them rocklike density and high crushing strength. The heavy steel hoops provide pre-stressed reinforcement against internal pressure.

Complete information will be gladly furnished upon request.

THE NEFF & FRY CO.
228 Elm St., Camden, Ohio

NEFF & FRY STORAGE BINS

Wyandotte Calcium Chloride gives coal a beauty treatment

Dusty coal is a nuisance. Dealers and their customers don't like it.

So give your coal a beauty treatment with Wyandotte Calcium Chloride. With only a small amount of Wyandotte Calcium Chloride, you can dustproof your coal, give it an attractive sheen. And Wyandotte Calcium Chloride costs so little.

To satisfy coal consumers. To keep them coal users. Show them you want their business by dustproofing with Wyandotte Calcium Chloride.

P.S. — *Dustproofing's freezeproofing — and come winter, that's important.*

Wyandotte CALCIUM CHLORIDE

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ORGANIC AND INORGANIC CHEMICALS

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Calcium Chloride Dept. A-4 — WYANDOTTE, MICHIGAN

Send more information about what Wyandotte Calcium Chloride can do for me.

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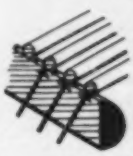
BEE ZEE ROUND ROD SCREENS

Here's a coal processing screen that *makes money for you.* Bee-Zee's non-blinding action keeps production at a fast, profitable pace.

COAL CAN'T CLOG . . .



a Bee-Zee Screen because the smooth, round top and tie rods touch at only one fine point of contact. There are no "pockets" or "blind spots" for even the smallest pieces of coal to collect. This means better, faster dewatering, too.

SCREENS LAST LONGER . . .

because round rods retain accuracy — *even with 50% wear.* Stainless steel, construction resists rust, corrosion and abrasion. Coal operators report Bee-Zee Screens last 10, 20 — even 30 times longer!

VALUABLE SCREEN INFORMATION

Write for the complete Bee-Zee catalog, explaining all the features of Bee-Zee Round Rod Screens and their use in coal processing. No cost or obligation.

BIXBY-ZIMMER ENGINEERING COMPANY

Bee-Zee Screens can be fitted to any coal processing equipment.

140 ABINGDON ST., GALESBURG, ILL.

BCR Annual Meeting

definition of mass production as "the planned, orderly and continuous progression of the commodity to completion," such a progression also is the answer in coal mining, Mr. Evans concluded, and "can be achieved by the scientific viewpoint, through research into the basic problems of the coal-mining process considered as a whole from a scientific angle."

Discussing "Research That Improves Coal's Position," Julian E. Tobey, president, Appalachian Coals, Inc., said: "The coal industry has a great future ahead of it. The United States, Canada and other areas of our world market are using increasing quantities of energy. Although our competitors are winning large shares of this new market, the coal tonnage produced will probably exceed in a few years all previous records. To gain our share of the fuel market and to maintain a profitable position, the coal industry needs the benefit of research." Mr. Tobey, who is chairman of the BCR Technical Advisory Board, acted as chairman of a panel of committee chairmen present in presenting a progress reports on their various fields of research activities.

One of the most important developments in the last year is the expansion of cooperative projects, in which outside but allied interests participate, Mr. Tobey reported. Some of the more recent cooperative projects he cited included: marine smoke abatement; reduction in fly-ash from spreader stokers; drying of agricultural products; automatic steam generators; gas producers; railroad electrification; and pending projects on block heating and electric steel furnaces.

Following his report on the accomplishments and objectives of these projects, Mr. Tobey offered brief summaries of other BCR programs, including: gasification and carbonization; preparation, drainage and waste disposal; domestic smokeless heaters, furnaces and boilers; residential stokers; house designs for coal; standard tests for stoker coals; and the organization's work for defense needs, which includes, for example, a coal heater for the Army now designed and under construction.

Installation of a coal-burning gas turbine in a full-size locomotive will be completed within a few weeks and within 3 mos. the industry will know the commercial possibilities of the unit, said J. I. Yellott, director of research, BCR Locomotive Development Committee, in a brief report on that project. The solution to the remaining problems is within our grasp and it is only a matter of keeping at it, he emphasized.

During the past year of development, the major problem has been to secure an efficient means of continuous ash removal, and the ash separator being installed can do the job effectively, it is believed. It also appears that the turbine blades will last as long as necessary. Tests have

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Testing mineral properties with our light gasoline drills. SATISFACTORY COAL CORES GUARANTEED. Ground solidification by our pre-pressure grouting method for shafts. Wet mine areas, horizontal holes for drainage. Electric drills for inside mine drilling.

MOTT CORE DRILLING CO.
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CHORUS IN HARMONY . . .

. . . *On Buying Information*

There is not a discordant note in the hundreds of comments received from users of McGRAW-HILL PRE-FILED MINING CATALOGS in the Coal Mining Field.

The chord of agreement on the usefulness of this Catalog echoes throughout such recent comments as:

"We do a lot of buying from your advertisers." Superintendent, Pennsylvania.

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HAMMONDS *SAFE* BLASTING EQUIPMENT

EXPLOSIVE BOXES

Approved by the Pa. Dep't. of Mines, these rigid non-conductive explosive boxes represent a prime safety investment. Made entirely of wood—tongue-grooved and dovetailed construction..., no metal parts...automatic lock...rubber band spring...moisture-resistant. Box sizes are based on 1¼" x 8" sticks.

POWDER BOX PRICES ARE AS FOLLOWS:

No. 9	$2.55 ea.	No. 25	$5.10 ea.
No. 12	2.95 ea.	No. 36	6.50 ea.
No. 16	3.45 ea.	No. 50	7.60 ea.
No. 20	3.90 ea.	No. 72	8.70 ea.

DETONATOR BOX PRICES ARE AS FOLLOWS:

No. 6, size 2½"x 3" x 6" inside.... $2.15 ea.
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WOOD TAMPING POLES

For Tamping Explosive Shots: Poles are round, made of Hardwood. Sizes to 10' long. Price per lineal ft.: 1" dia. 8c; 1⅛" dia. 12c; 1¼" dia. 14c; 1⅜" dia. 16c; 1½" dia. 18c; 1⅝" dia. 20c; 2" dia. 32c. Special diameters and lengths can be furnished. These Poles meet the requirements of the New Federal Mine Safety Code.

SECTIONAL TAMPING POLES

These Poles are made of straight grained wood and are coupled together with reversible wood pins held in place in recessed grooves by a rubber band and can be quickly connected and unconnected.
Couplers and Head Blocks are 4, 5 and 6 inches in diameter. Please specify size when ordering. Poles are 1½" in diameter.
Head Blocks, $2.70 ea.; Couplers, $2.90 ea.; Poles 12 feet long, $3.00 ea.; Poles 14 feet long, $4.20 ea.; Poles 16 feet long, $4.80 ea.; Poles 18 feet long, $5.30 ea.; Poles 20 feet long, $7.00 ea.; Poles 22 feet long, $8.80 ea.; Poles 24 feet long, $9.60 ea.

J. V. HAMMOND CO., Spangler, Pa.

We also manufacture Shot Firing Units, Wooden Mallet and Wedge Sets, Trolley Poles, Sounding Sticks, Mine Rollers, Insulation Blocks and Brake Blocks

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Dependable — Accurate

TRUCK and TRACTOR TRAILER SCALES

TYPE "C. S." *Portable Scale*—easily and quickly set up—with preparation held to minimum.

TYPE "S" *Pit Scale*—for weighing trucks and tractor trailers—Platform lengths 18 ft. to 60 ft. inclusive.

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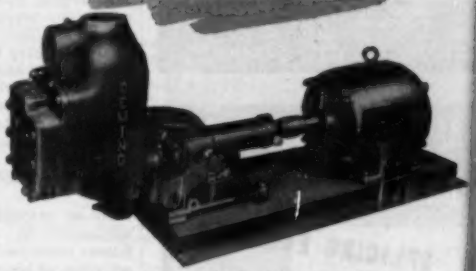

Fig. 3312 Self-Priming Centrifugal Pump will be exhibited for your inspection.

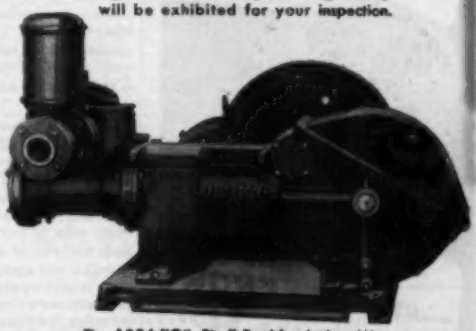

Fig. 1896 "Oil-Rite" Double-Acting Mine Pump will be exhibited for your inspection.

THE DEMING COMPANY
533 BROADWAY • SALEM, OHIO

DEMING MINE PUMPS

This User says:

Belt Joints now in 7th month joined with

CRESCENT BELT FASTENERS

Yes, this Conveyor-belt joining had to be renewed every 3 weeks—UNTIL Crescents were used. The Crescent Fasteners had been in use 7 MONTHS when photographed, with no noticeable sign of wear. It's the same story wherever Crescent Belt Fasteners are used—Belts handling ore, coal or rock—belts under terrific strain—are joined with Crescents; and the fastening is good for the life of the belt. There's a size and type of Crescent Plate and Rivets for every type and size of flat belting and pulleys for conveyor, transmission or elevator belting. Strong, smooth, noiseless, economical, long lasting. Used in all industries over the world. For complete details, service charts of sizes, etc., write or phone nearest office today.

Outside

Pulley side

CRESCENT BELT FASTENER COMPANY
[illegible] LEXINGTON AVENUE, NEW YORK
[illegible] CHICAGO, TORONTO, [illegible]
CANADA 65 MARKET [illegible]

BCR Annual Meeting

proven that the turbine will successfully run on coal, with an efficiency of 95 to 96%, and actually it was a comparatively simple job to get the unit to operate on coal, Mr. Yellott said. But other problems, such as introducing coal into the boiler at 5 to 6 times atmospheric pressure and removing fly-ash, have been major considerations.

In "Applying Research Results to Markets," said Frank T. Sheets, president, Portland Cement Association, "It is highly important to take all possible steps to shorten the lag between research and practice, to interpret the results of research and development in terms understandable to the so-called 'practical man,' and to sell the fruits of research and development to business executives, stockholders and the general public."

The differences in interests, attitudes and activities of research men as a group, and those of busy practicing engineers, business executives and products users, make it imperative that "interpreters shall be born, trained, used and honored" to translate research findings into language that the average executive and engineering practitioner can comprehend, Mr. Sheets pointed out. After that comes the larger problem of selling the public, and "all too often people in the industry become so thoroughly engrossed in the day-to-day problems of competing with each other for the available business that they forget, or overlook, or do nothing about the major problem of creative selling that is essential to maintaining markets already established and creating new ones."

As an example of a "statesmanlike approach" to such problems, Mr. Sheets described the organization and activities of his own association, which represents 67 members operating 141 plants and maintains a general headquarters staff of 180 and a field organization of more than 300 working out of 26 district offices to serve cement users and promote the use of concrete.

At the luncheon, with B. R. Gebhart, vice president of CW&F and BCR vice president, presiding, C. C. Furnas, director, Cornell Aeronautical Laboratory, discussed research in its role as "Industry's Vital Force." Speaking as "one who is not versed in the details and the art of coal and its uses," he pointed out many opportunities where coal might apply research to open up entirely new markets and uses and broaden its present scope. "The process industries, including petroleum, spend an average of 2% of sales on research and development, and find it very profitable, indeed," Mr. Furnas emphasized. "BCR with a $1 million budget on some $2 billion of product is spending an infinitesimal 0.05%. This is all out of proportion to the magnitude of the task involved" he concluded.

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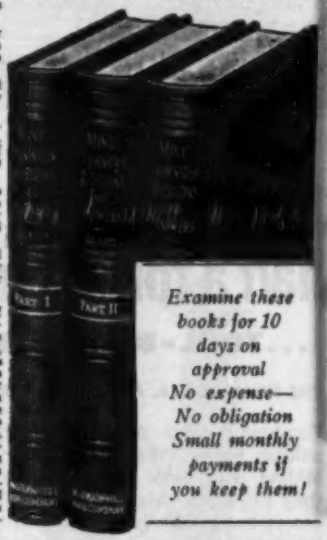

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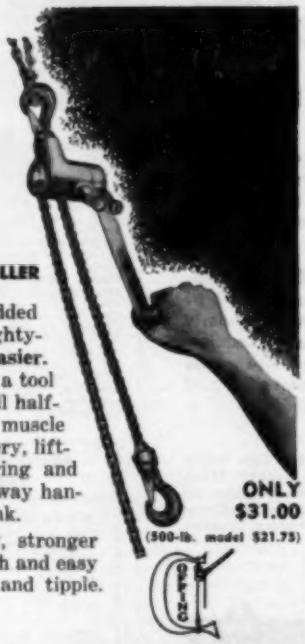

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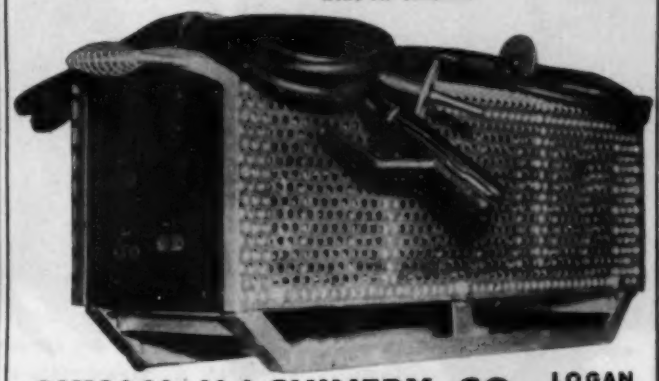

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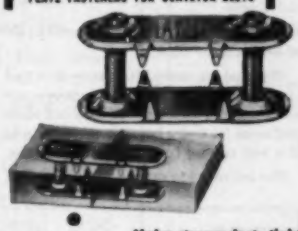

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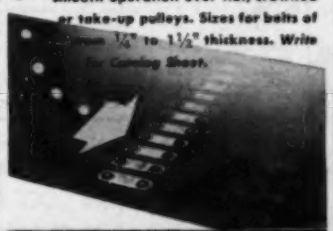

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But he's wrong!

Because you and all of us have set out to build more and better weapons—to do it faster all the time.

We must use every bit of know-how and inventive skill we have to improve our machines and methods—to turn out more and more for every hour we work. Only in this way can we become militarily strong.

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We carry in stock for your immediate requirements, Conveyor Belting in widths from 8 inches to 48 inches.

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10"	4	1/16"	1/32"	28 Oz.
12"	4	1/16"	1/32"	28 Oz.
14"	4	1/16"	1/32"	28 Oz.
16"	4	1/8"	1/32"	28 Oz.
18"	4	1/8"	1/32"	28 Oz.
20"	4	1/8"	1/32"	28 Oz.
20"	5	1/8"	1/32"	28 Oz.
24"	4	1/8"	1/32"	28 Oz.
24"	5	1/8"	1/32"	28 Oz.
28"	5	1/8"	1/32"	28 Oz.
30"	4	1/8"	1/16"	32 Oz.
30"	5	1/8"	1/16"	32 Oz.
30"	6	1/8"	1/16"	32 Oz.
36"	6	1/8"	1/16"	32 Oz.
42"	5	1/8"	1/16"	32 Oz.
48"	8	1/8"	1/16"	32 Oz.

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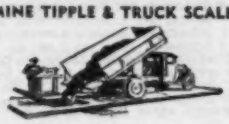

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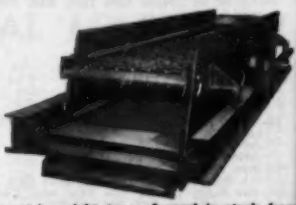

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300 H.P. Vulcan Double Drum Hoist, 750 FPM, 8' dia. drums grooved 1½", will stow 700' rope on one layer, clutch on one drum, air brakes, overspeed device, overwind device, reversing magnetic control, General Electric Motor, 440 volts, 3 phase, 60 cycles.

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1—Ottumwa Iron Works, single rigid cylindro-conical drum hoist, serial #6080, weight 43,000 lbs. 1⅛" rope complete with remote control and hydraulic brakes direct connected to Western Electric 150 HP, motor, model 17615, type MT-504-10-150-TBB, form B, 3 phase, 60 cycle, 440 volts, slip ring, secondary volts 388, amps. 187, secondary amps. 183, speed full load 709, serial #4563312 continuous 40° C. Complete controller and resistance.

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3—4 ton Goodman ball-bearing locomotives, 36" gauge, type 220ET.

1—6 ton Goodman ball bearing locomotive, 42" gauge, type 33-AO-47.

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1—4 ton Goodman ballbearing locomotives, 20" gauge, type 43-I-4-T. (with or without gathering reels).

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1—112AA Goodman DC Universal mining machine, 36" gauge, 6½ ft. cutter bar.

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1—Sullivan Shearing Machine, Class CH11, DC 9' cutter bar.

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1—288 KW Synchronous Ridgway Motor Generator Set, 1200 rpm. 250 volts DC, 2300 volts, AC, complete with switchboard.

1—96 KW GE motor generator set type CD 128, form A, comp. wound, 337 amps, 250 volts no load, 375 volts full load, 1200 RPM, cont. 50 deg. cent., #1539906 direct connected to 135 HP GE syn. motor type TS form PK, frame 7558, 3/60/2200 volts, 1200 RPM, 37.6 amps, cont. 40 deg. cent. Excitation 250 volts, 8.6 amps. .74 PF, #4316071, complete with switchboard.

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1—Stearn tipple complete with shaker and concrete silos. Capacity 1,000 tons per day.

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150 KW G.E. RC 550 v. 1200 RPM
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100 KW West. 250 v. 600 RPM

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HP	MAKE	SPEED	TYPE	WDG.
1250	G.E.	277	MT	S.R.
600	G.E.	600	MT	S.R.
400	G.E.	450	MT	S.R.
300	G.E.	450	IM	S.R.
160	G.E.	600	IK	S.C.
150	West.	504	CS	S.C.
150	G.E.	600	ATI	Syn.
2—100	G.E.	450	IM	S.R.
100	Al.-Ch.	720	ARX	S.C.
5—100	West.	1200	CS	S.C.
75	G.E.	600	ITC	S.R.

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8 Ton Goodman 250 v. 44/428" Ga. 9104C2
8 Ton Goodman 500 v. 44/42" Ga. 9104C2
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1—24 x 24 Jeffrey Single Roll, with or without motor

1—36" American Ring Type Crusher

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150—Card RB Pit Cars, 36" ga., 1.7 ton cap.

16—Card RB Pit Cars, 36" ga., 1 ton cap.

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1—3 Drum I.R. Slusher, with built-in 50 HP AC Motor

1—#21½ Vulcan Single Drum, direct geared to a U-6 International Gas Power Unit

1—#6½ Vulcan, single drum

1—Box Iron Wks. Single Drum, direct geared to a 15 HP Slip-ring Motor

1—H&B Single Drum Converted, direct geared to a 25 HP Slip-ring Motor

1—Crow Converted Single Drum Friction, direct geared to a 7½ HP Slip-ring Motor.

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1—D-4400 Caterpillar V-belted to a 30 KVA 220 Volt Fairbanks, Morse AC Generator, complete with switchboard.

MISCELLANEOUS

1—20 HP Upright Boiler

1—12" x 30" Suspension Type Jeffrey Vib. Feeder

25—Tons 85# Rail

50—Tons 60# Rail

1—G-20 Goodman Shaker Conveyor, with pans & duckbill

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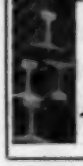

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FOR SALE: Fairbanks-Morse 3 cylinder, 210 hp, diesel engine, with A-C generator. This style VA diesel engine, operating at 300 rpm, is mounted in line to generator with continuous rated capacity of 97 KW; percentage power factor equals 80; amperes per terminal, 291; temperature rise, 52 degrees; KVA rating, 112.5—3 phase, 60-cycle, 240-volts hooked up with exciter to produce alternating current.

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3—7½ H.P. Westinghouse, type CSP—Life Line, Totally enclosed fan cooled—Nema frame 324, AGMA class 33 gears—output speed 20 R.P.M. 3/60/220/440 volts. (1) New—Others slightly used.

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SQUIRREL CAGE MOTORS
3-Ph., 60-Cy.

Qu.	H.P.	Make	Type	Volts	RPM
1	400	G.E.	1K	2300	514
1	400	G.E.	KT-412	2300	450
1	250	Whse.	CS	2200	1160
1	200	Al. Ch.	AR	220/440	580
2	125	Al. Ch.	AR	2200	1750
1	125	Whse.	CR-761	440	1750
1	125	G.E.	KT-568	2300	875
2	125	C.W.	126Q	440	430
3	100	Whse.	CR-663	440	1750
1	100	Al. Ch.	AR-226	2200	1160
1	100	Al. Ch.	AR	550	690
1	100	F.M.	H-241B	440	450
1	100	Whse.	CR-959	2300	514

SYNCHRONOUS MOTORS
3-Phase, 60-Cycle

Qu.	H.P.	Make	P.F.	Volts	R.P.M.
1	1500	Whse.	.8	2300	720
1	700	C.R.	.8	2300	720
1	600	Whse.	.8	440	600
1	265	Al. Ch.	1.	2200	900
1	150	G.E.	1.	2200	900
1	150	G.E.	.8	550	450
1	150	G.E.	.8	2200	600
3	125	Al. Ch.	1.	4800/2400	900
1	125	Al. Ch.	.8	2200	900
2	100	Whse.	.8	440	1200
1	100	Whse.	1.	2200	1200
1	100	Ideal	.8	440	900
2	100	G.E.	.8	440	600
1	60	G.E.	.8	440	1200
2	50	G.E.	.8	2200	600

With the above we can supply manual, semi-magnetic or full magnetic reduced or full voltage control.

SLIP RING MOTORS—CONSTANT DUTY
3-Phase, 60-Cycle

Qu.	H.P.	Make	Type	Volts	R.P.M.
1	3000	G.E.	MT	2200	356
2**	1000	AL.CH.	ANY	2200	235
2	500	G.E.	1-16-M	2300	450
1	500	WHSE.	CW	2300	514
1	500	AL.CH.	ART	2300	804
1***	400	G.E.	MT-574	550	585
1**	400	G.E.	1-M	2300	900
1**	400	AL.CH.	ANY	2300	585
2	300	G.E.	MT-412	2300	440
1	300	G.E.	1-E15-M	2300	1200
1	200	AL.CH.	ANY	2300	585
1	250	G.E.	MT-414	2300	300
1	200	G.E.	1-M	2300	585
1	150	G.E.	1-E15-M	2300	1750
1	150	WHSE.	CW	2300	600
1***	125	WHSE.	CW-870	2300	900
1	100	F.M.	420-C	440	900
1	75	G.E.	1-M	440	600
1	50	G.E.	MT-536	2300	1150
1	50	AL.CH.	ARY	440	850
1	50	AL.CH.	ARY	2300/440	514
1	50	F.M.	8LS	440	600
1	40	AL.CH.	ART	2300/440	435

—Mill type pedestal bearing. *—3-bearing.

TRANSFORMERS (OIL COOLED)

Qu.	K.V.A.	Make	Type	Phase	Voltage
1	7500	G.E.	H	3	23000/29700 / 13800/12600
2	4500	G.E.	H.T.	3	27000/13500 / 2300
1	2750	WHSE.	S	3	67000/14600 / 2400
3	500	G.E.	H	1	13200/11880 / 220/440
3	120	G.E.	H	1	19000/9500 / 550/2200
3	100	WHSE.	AUTO	1	2300 /4160 / 1385/2400
3	100	WHSE.	S.S.	1	13075/10955 / 220/440
2	50	WAGNER	H.V.	1	13200/11880 / 575/285
3	30	AL.CH.	OISC	1	22900 — 220

MOTOR GENERATOR SETS

Qu.	KW	Make	RPM	Volts DC	Volts AC
1	750	Whse.	900	600	2300
1	700 (3-U)	G.E.	720	250	2300/440
1	500 (3-U)	Whse.	1200	120/240	4000/2300
1	500 (3-U)	Ideal	1200	120/240	4000/2300
1	500	C.W.	720	575	2300/440
2	500	C.W.	720	250/275	2300/440
1	200	Ridgway	900	275	2300
1	155	G.E.	720	250	2300/440
1	150	Al.Ch.	1200	250	2300/440
1	100	Ridgway	1200	275	4000/2300
1	75	C.W.	1200	250	2300/440
1	75	Star	1200	230	440/220
1	75	Al.Ch.	900	250	2300
2	50	Burke	1800	240	440/220
1	45	Whse.	1200	125	440/220
1	30	Reliance	1800	250	440/220
2	25	Whse.	1200	120/240	440/220
1	20	Reliance	1800	250	440/220

3-U—3-unit set

We can also furnish any of the above with exciters and VARIABLE VOLTAGE CONTROL engineered and remade to suit your requirements.

DIRECT CURRENT MOTORS

QU.	H. P.	MAKE	TYPE	RPM
1	250	G.E.	CD 160	1150
1	225	Whse.	QM	450/900
1	200/250	El.Dy.	No. 82	600/1200
1	200	Whse.	Mill (Rev)	300/1200
1	180	G.E.	MPC	600
1	150	Al.Ch.	Mill (Rev)	600/1200
2*	150	Cr.Wh.	83H	850
1***	125	Whse.	810C-190	600
1	140/125	Rel.	1995P	300/1200
2	100	Rel.	1050T	600/1200
1	90/100	G.E.	MPL	600/1125
1*	50/75	Rel.	1095P	300/1200
1	50	G.E.	RP16	300/900
1*	30/75	Whse.	SK151L	600/1200
1	40	Al.Ch.	E127	850/1750
1	35	G.E.	CD125	600/1200
1	35	G.E.	CD147	300/1500
2	35	G.E.	RP14	600/1500
1	35	Rel.	T	250/1000
1	32½	Whse.	SK156	600/1200
1	30	Al.Ch.	E145	600/1200
1	30	G.E.	CD148105	975/1750
2	27½	El.Dy.	15R	650/1350
1	25	G.E.	RP13	600/1600
2	25	G.E.	CD123	600/1200
1	25	G.E.	RP12	600/1500
1	25	Whse.	SK111L	250/1000
3	20	Al.Ch.	E130	600/1500
3	20	Whse.	SK120	575/1500
2	20	G.E.	CD122	300/1200

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1—5-Track Steel Tipple, capacity 4000 tons per day, 300 tons per hour, Link-Belt Coal Washer with three Allis-Chalmers low head Gewaterlings screens, four large loading booms and picking tables, various conveyors, motors and all necessary appurtenances. This is a recent installation, complete in every respect, offered at a very attractive price.

We also have two all steel Tipples available for shaft mines, 3-track and 4-track, complete with shaker screens, loading booms, picking tables, conveyors, and two practically new 42" slope belts.

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2—Slope Hoists with 700 HP Allis-Chalmers 2300 volt motors, Herringbone gears, hydraulic and dynamic braking, G.E. liquid rheostat, contactor controls; drum will spool 5000' to 6000' of 1¼" rope, rope pull 20,000#; rope speed 1200 FPM.

1—Nordic-Tyrone Hoist with 700 HP General Electric motor, 2300 volt, hydraulic and dynamic braking, contactor controls, rope speed 1200 FPM, rope pull 23,000#; drum will spool 5000' of 1¼" rope.

The above Hoists can be used operating. Also have several 250 HP to 350 HP Hoists suitable for slope, drift, or shaft mines.

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2—15-ton Jeffrey, Type MH-110
2—10-ton General Electric, Type HM-830
2—10-ton Westinghouse, Type 917-C
1—10-ton Westinghouse, Type 907-C
1—8-ton General Electric, Type HM-819
1—8-ton Westinghouse, Type 305C
4—8-ton Goodman, Type 32A14T
4—4-ton General Electric, Type HM-821
2—4-ton General Electric, Type HM-801
2—4-ton General Electric, Type HM-804
3—4-ton Jeffrey, Type MH-88
5—4-ton Goodman, Type 30B

LOADING MACHINES

4—6-BU Joy, 220 volt AC, 42" track gauge, with cable, in good operating condition.

SUBSTATION EQUIPMENT

1—500 KW General Electric Rotary Converter, Type HCC-6, Form P, 900 RPM, 250/275 volt DC, complete with switchboards and switchgear.

1—100 KW General Electric Rotary Converter, Type HCC-6, Form P, 1200 RPM, 275 volt DC, complete with switchboards and switchgear.

1—200 KW General Electric Synchronous Motor Generator Set, Type MPC 6-200-1200, 250/275 volt DC, 3 phase, 60 cycle, 2300 volt AC.

1—200 KW Westinghouse Synchronous Motor Generator Set, Type SK 6-200-1200, 250/275 volt DC, 3 phase, 60 cycle, 2300 volt AC.

MINING MACHINES, 250 VOLT DC

8—35B Jeffrey
2—35-BB Jeffrey
6—512 Goodman
3—1215 Goodman
14—12AA Goodman
6—7AU Sullivan Track Cutters

SHUTTLE BUGGIES

4—Joy Type 42E, cable reel, 250 volt DC. In excellent condition.

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500—All Steel Rotary Dump Mine Cars, 3-ton capacity, 16" Timken roller bearing wheels, height 36", track gauge 36". All practically new. A bargain for quick sale.

100—All Steel End Dump Mine Cars, 3-ton capacity, Timken bearing wheels, 26" high, 42" track gauge. In perfect condition.

100—Brand new Sanford-Day Rotary Dump All Steel Mine Cars, 3-ton capacity, 6' wide, 11'6" overall length, inside length 10', height 36", wheel base 32", 5" axle, 10" wheels, 42" track gauge.

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COAL AGE ADVERTISERS IN THIS ISSUE

MORE INFORMATION on any product advertised in COAL AGE may be easily secured by using the postage-free card facing p 116.

*Ankar Drill Co. 168
*Air Reduction Co., Inc. 158
Alemite, Div. of Stewart-Warner Co. .. 8-9
*Allen-Sherman-Hoff Co. 127
*Allis-Chalmers Mfg. Co. 16
American Cable Div. of American Chain & Cable Co. ..... Third Cover
*American Car & Foundry Co. ..... Second Cover
American Crucible Products Co. 162
*American Cyanamid Co. (Expl. Dept.).. 111
American Optical Co. 161
*American Pulverizer Co. 131
*American Steel & Wire Co. 118
American Steel Foundries 165
Armstrong-Bray & Co. 175
*Atlas Car & Mfg. Co. 166
Atlas Powder Co. 42

Baltimore & Ohio Railroad 143
*Barber-Greene Co. 65
*Bemis Bro. Bag Co. 139
*Bethlehem Steel Co. 12, 47
*Bird Machine Co. 4
*Bituminous Casualty Corp. 165
Bituminous Coal Institute 60
*Bixby-Zimmer Engrg. Co. 170
Blackhawk Mfg. Co. 163
Boston Woven Hose & Rubber Co. 54
*Bowdil Co. 30
Bucyrus-Erie Co. 28

Cabot, Inc., Samuel 177
Campbell Co., E. K. 167
Carboloy Co., Inc. 48-49
*Carlon Products Corp. 14
Caterpillar Tractor Co. 53
Chevrolet Motor Div., General Motors.. 38
Chicago Perforating Co. 170
Citim Service Oil Co. 120
Coal Operators Casualty Corp. 154
Coffing Hoist Co. 174
*Colorado Fuel & Iron Co. 55
*Columbia Steel Co. 118
Commercial Shearing & Stamping Co. 166
*Connellsville Mfg. & Mine Supply Co.. 146
Crescent Belt Fastener Co. 172

*Deister Concentrator Co. 148
*Deming Co. 171
*Dings Magnetic Separator Co. 153
Dodge Mfg. Corp. 155
Duff-Norton Mfg. Co. 138
Duralkool, Inc. 156
duPont de Nemours Co., E. I. (Rayon Div.) 36

Eaton Mfg. Co. ..... Insert between pp. 52-53
*Eimco Corp. 26
*Electric Storage Battery Co. 103
*Ensign-Bickford Co. 68
Ensign Electric Mfg. Co. 168
*Euclid Road Machinery Co. 117

Fairbanks, Morse & Co. 22
Firestone Tire & Rubber Co. 67
Firth Sterling Steel & Carbide Corp. 107
Flexible Steel Lacing Co. 167
*Flood City Brass & Electric Co. 127
Foster Co., L. B. 174
Fuller Mfg. Co. (Transmission Div.) ... 137

Gates Rubber Co. 25
*General Electric Co. (Apparatus Dept.) 10-11, 34, 56
General Tire & Rubber Co. 59
*Goodman Mfg. Co. 13
Goodrich Co., B. F. 1
Goodyear Tire & Rubber Co. 15
*Goyne Steam Pump Co. 167
Greensburg Machine Co. 180
Gulf Oil Corp. 41
Gulf Refining Corp. 41
Gundlach Machine Co., T. J. 164
Guyan Machinery Co. 175

Hammond Co., J. V. 171
*Hazard Insulated Wire Works 63
Harnischfeger Corp. 135
*Hendrick Mfg. Co. 164

Hewitt Rubber of Buffalo, Div. of Hewitt-Robins, Inc. 52
*Heyl & Patterson, Inc. 21
*Holmes & Bros., Inc., Robt. 151
Hulburt Oil & Grease Co. 2-3

Indiana Bearings, Inc. 147
*Indiana Foundry Co. 169
International Harvester Co. 30

*Jeffrey Mfg. Co. ....Insert between pp. 20-21
Johnson Plastic Co. 116
*Jones Foundry & Machine Co., W. A. ... 17
Joy Mfg. Co. ...Insert between pp. 36-37, 57

*Kennametal, Inc. 113
Koppers Co., Inc. 143

*Laughlin Co., Thomas 140
LeRoi Co. 46
LeTourneau, Inc., R. G. 44-45
*Link-Belt Co. ..... 27, Fourth Cover

Mack Trucks, Inc. 33
Macwhyte Co. 61
Manhattan Rubber Div. 43
Manheim Mfg. & Belting Co. 64
*Manitowoc Engrg. Works 139
Marion Power Shovel Co. 37
McGraw-Hill Book Co. 173
*McGraw-Hill Catalog Service 170
*McLanahan & Stone Corp. 35
*Merrick Scale Co. 154
Mine & Smelter Supply Co. 173
*Morris Machine Works 152
*Mott Core Drilling Co. 170

*National Tube Co. 118
Neff & Fry Co. 169

Ohio Brass Co. ...Insert between pp. 108-109
*Okonite Co. 172

Paris Mfg. Co. 39
Pennsylvania Bearings, Inc. 147
Pennsylvania Drilling Co. 177
Pittsburgh Knife & Forge Co. 172
Post-Glover Electric Co. 32A
*Prox Co., Inc., Frank 20

Raybestos-Manhattan, Inc. Manhattan Rubber Div. 43
Ridge Equipment Co. 160
Robins Conveyors Div., Hewitt-Robins, Inc. 52
Roebling's Sons Co., John A. 31, 163
Rollway Bearing Co., Inc. 24
*Ruberoid Co. 156
Rust-Oleum Corp. 139

*Sanford-Day Iron Works, Inc. 38
*Screen Equipment Co. 62
Searchlight Section 178-183
*Simplex Wire & Cable Co. 23
Socony-Vacuum Oil Co., Inc. 144
Standard Oil Co. (Indiana) 29
Stoody Co. 141

Templeton-Kenly Co. 142
Tennessee Bearings, Inc. 147
*Tennessee Coal, Iron & Railroad Co. 116
Texaco Co. 6-7
*Thermoid Co. 51
*Timken Roller Bearing Co. 123

United States Rubber Corp. 32, 157
*United States Steel Co. 118
*United States Steel Supply Co. 118
*United States Steel Export Co. 118
*United States Steel Subsidiaries 118
Upson-Walton Co. 40

Victaulic Co. of America 150
Viking Machinery Sales Corp. 178

*Wedge-Wire Corp. 172
*Wellman Engrg. Co. 149
West Virginia Bearings, Inc. 147
Western Knapp Engrg. Div., Western Machinery Co. 115
Western Machinery Co. 133
Westinghouse Elec. Corp. 18-19
*Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp. 55
Winslow Scale Co. 171
Wyandotte Chemicals Corp. 169

Yardley Plastics Co. 66

■

PROFESSIONAL SERVICES 174, 175

■

SEARCHLIGHT SECTION
(Classified Advertising)

EMPLOYMENT
Position Wanted 178
Employment Agencies 178

BUSINESS OPPORTUNITIES
Offered 178

EQUIPMENT
(Used or Surplus New)
For Sale 179-183

WANTED
Equipment 178

ADVERTISERS INDEX

Banner Block Coal Co. 178
Benney Equipment Co., R. H. 182
Berrettini Electric Co. 180
Bonded Scale & Machine Co. 179
Bressler's Coal Co. 178

Carlyle Rubber Co., Inc. 179
Coal Mine Equipment Sales Co. 183

Dalton Supply Co. 182, 183

Electric Equipment Co. 182
Electric Service Co., Inc. 182

Falk Machinery Co. 179
Fish & Co., J. T. 180, 181
Florence Machinery & Supply 182
Foster Co., L. B. 182
Frank, M. K. 182

Gavenda Brothers, Inc. 181
Glazer Steel Corp. 182
Greensburg Machine Co. 180
Greenwood Mining Co., The 183
Grove & Whalen 178

Hawkins & Co. 180

Industrial Equipment Corp. 181

Kaiser Steel Corp. 180
Kirk, Donald 178
Kirk Co., Wallace E. 180

Land, Inc., L. J. 183
Lefton Industrial Corp. 182
Little Chief Coal Co. 178
Locke Co., C. B. 183

MacCabe Co., T. B. 183
Midwest Steel Corp. 182
Mississippi Valley Equipment Co. 179
Moorhead Electrical Machinery Co. ...179, 181

O'Brien, William C. 182
Ohio Valley Baking Co. 182

Reid-Holcomb Co., Inc. 180

Smith & Smith 182
Smith Co., H. Y. 182

Taylor Coal Mining Co., The 178
Terteling Bros., Inc. 180
Tipping Machinery Co. 181
Tomsett Associates 178

Wagner Co., Arthur 183
Wynn, Terrence P. 180

* Indicates that detailed information may be found in the 1950-51 MINING CATALOGS.

This index is published as a convenience to the reader. Every care is taken to make it accurate, but C. A. assumes no responsibility for errors or omissions.

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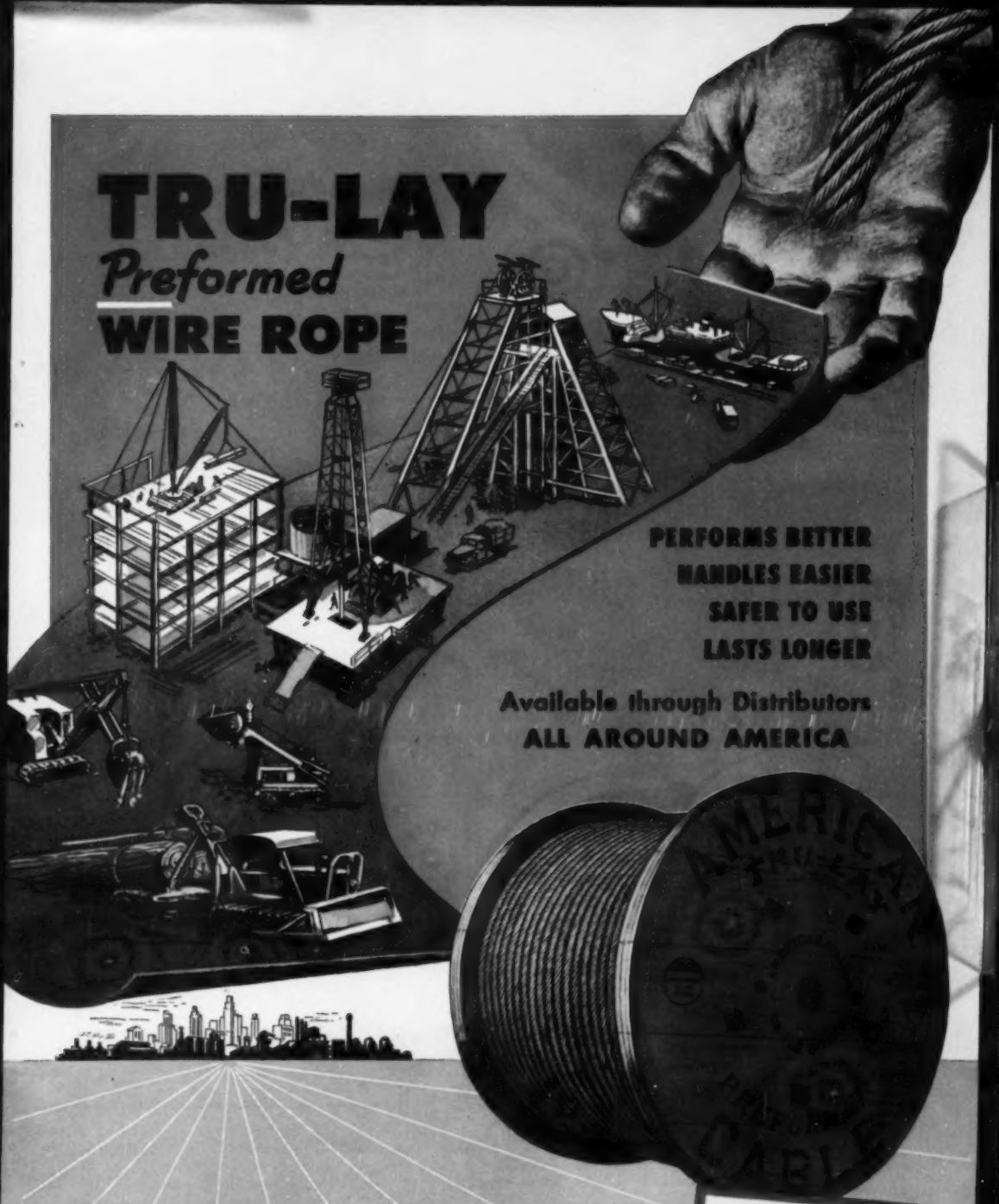

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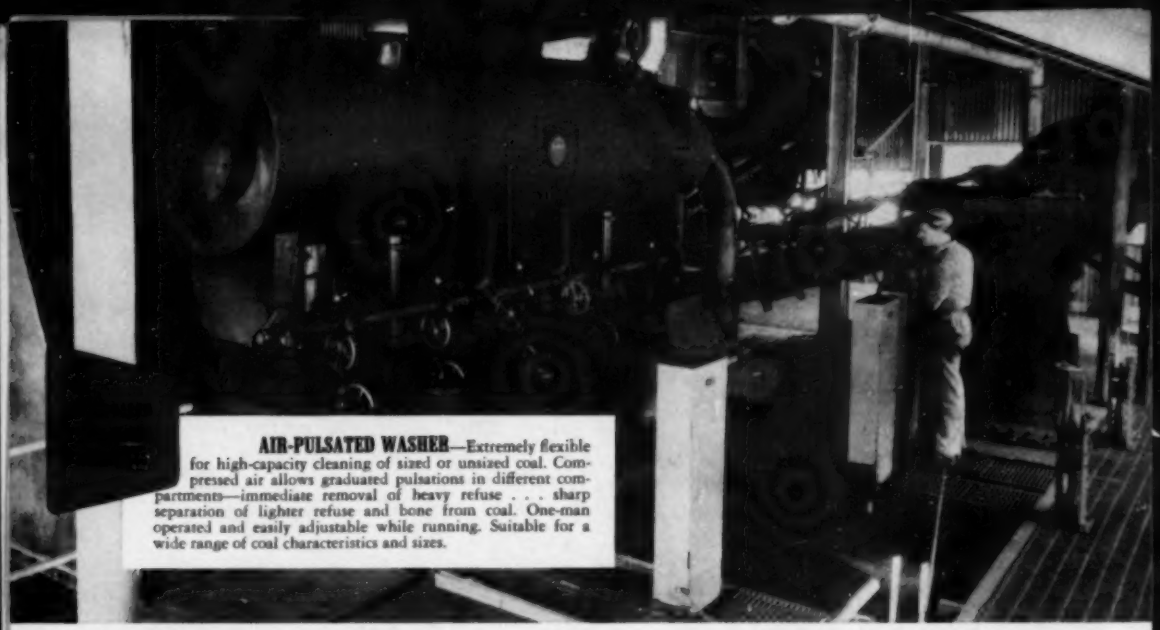

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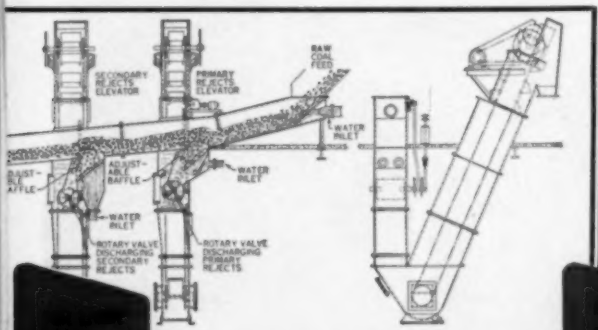
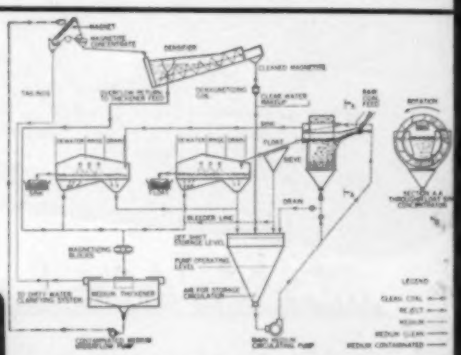
For Link-Belt offers three types of coal washers... each designed for a different set of requirements... each tops in its field. Why not have a Link-Belt coal preparation specialist help you and your consultants map out your coal washing plans.



TROUGH SEPARATOR—By placing a Link-Belt Trough Separator ahead of the Air-Pulsated Washer, a large additional capacity can be cleaned with little added investment or operating expense. Trough floats off a large part of the coal so clean it requires no further treatment. Remaining coal and middlings then go to air-pulsated jig.



FLOAT-SINK CONCENTRATOR — Latest advance in coal cleaning — utilizes Heavy-Media* separation process. Efficient for extremely high or low specific gravity separation... when a large percentage of coal is near the separation gravity... when amount of impurities in feed fluctuates or product must be quickly changed. Cleans larger sizes, reducing necessity for manual picking.

LINK-BELT COMPANY: Chicago 9, Philadelphia 40, Pittsburgh 13, Wilkes-Barre, Huntington 9, W. Va., Louisville 2, Denver 2, Kansas City 8, Mo., Cleveland 15, Indianapolis 6, Detroit 4, Birmingham 3, St. Louis 1, Seattle 4, Toronto 8, Springs (South Africa). 12,287

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COAL PREPARATION and HANDLING EQUIPMENT

* The Heavy-Media Separation Processes are licensed by the American Zinc, Lead and Smelting Co. American Cyanamid Co., 30 Rockefeller Plaza, New York 20, N. Y., are their sole Technical and Sales Representatives for these processes.